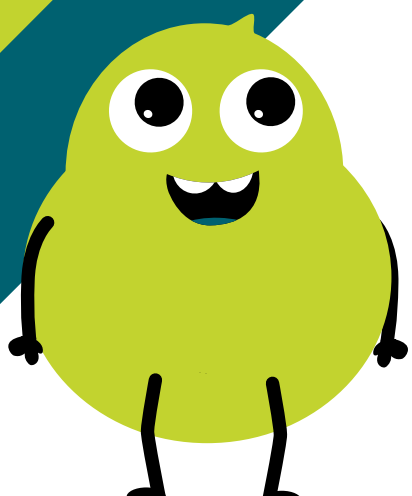
BRITISH SCIENCE WEEK

GROWTH

PRIMARY ACTIVITY PACK

11-20 March 2022
britishscienceweek.org
A range of activities
to be run with pupils aged 5-11



Delivered by

BRITISH SCIENCE ASSOCIATION

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BRITISH SCIENCE WEEK 2022

This activity pack is a one-stop shop to support you during **British Science Week,** and you can use it all year! Feel free to adapt or extend the activities to suit your pupils' needs or the curriculum you are delivering.

There are lots of other ways to get your pupils enthusiastic and engaged throughout British Science Week. When developing this pack, we looked for activities which promote cross-curricular learning and break down the stereotypes surrounding science, technology, engineering and maths (STEM). We therefore encourage you to use British Science Week as an opportunity to link STEM to other curriculum subjects and to your pupils' own backgrounds, lives and interests.

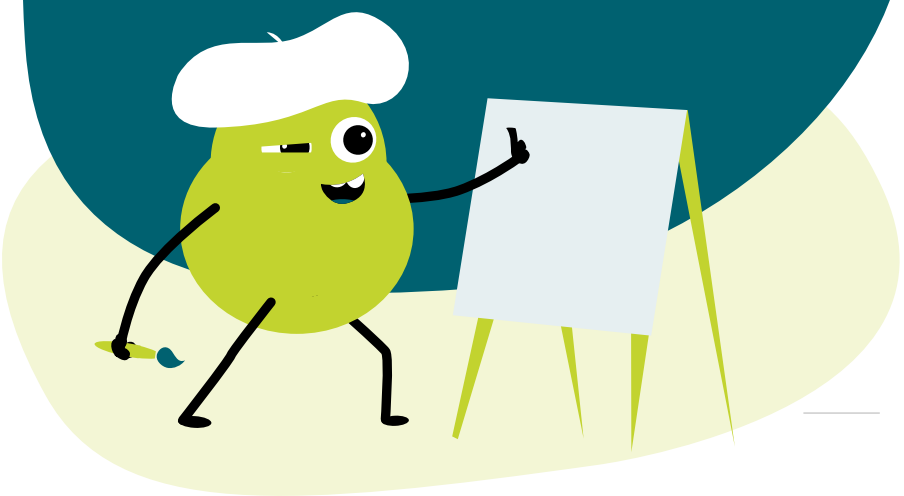
This year, we have included activities for pupils to complete in any setting, whether that's their school, a club, an organisation or at home with their families.

Find an activity near you:

You can either create your own activity, or see what activities are happening near you. Last year we reached more than 100,000 people. Help us make British Science Week 2022 even bigger and better! Visit **sciencelive.net** to find science activities in your local area.

Enter our poster competition

Why not ask pupils to design a poster based on any of the activities in this pack and enter it into our poster competition? Simply look out for the activities marked with the paintbrush symbol shown opposite!
The theme for this year's poster competition is 'Growth', and you can find more information on how to enter on **page 39** and at **britishscienceweek.org/plan-your-activities/poster-competition**.



BRITISH SCIENCE WEEK 2022

CONTENTS

BRITISH SCIENCE WEEK 2022

INTRODUCING THE THEME

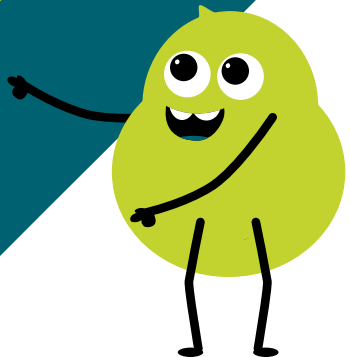
The theme this year for British Science Week is 'Growth'! Introduce the theme to pupils in a fun, imaginative way to get them excited about the week ahead. Check out some ideas on how to do this below.

- **Share your brilliant activities, vlogs or images on social media!** Join the conversation or see what's happening during the Week by tagging the British Science Association (@ScienceWeekUK) and using the hashtag #BSW22.
- **Try a game,** give an audio-visual presentation, explore a mystery or special object, or create a pop-up display which communicates the theme of 'Growth'. These are great to use as fun warm-up activities and are a fantastic way to start British Science Week.
- **Get pupils to dress up** to personify 'Growth'. They could come to school as their favourite scientist (and feel free to think outside the box – the costume can be more than a white laboratory coat!), or perhaps as an innovation that drove growth. Invite them to share the story behind their costume with the class.
- **Encourage pupils to come up with an acrostic poem** for GROWTH by asking them what comes to mind when they hear it. You can even turn their acrostic poem into a jingle which you can sing with them throughout the Week to help them remember their ideas.
- **Engage pupils** by discussing how growth is part of people, plants, animals, materials, countries and other things in their everyday lives. What are good examples of growth?
- **Invite a special guest** or someone from the school community to share with pupils their own experience of growth (for example, how they started their career and gained their expertise), showing how great things can start from small beginnings. See page 5 for information on how to get volunteers.

Here are some other ideas to include at the beginning of British Science Week.

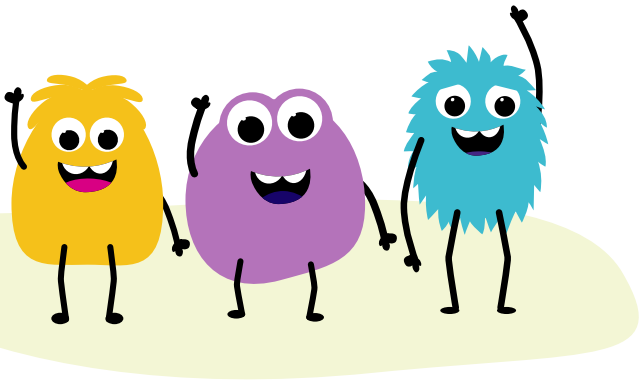
- **Tell pupils about the plan for the Week** and give them a challenge related to the theme. If you are sending home a family experiment, maybe you could introduce or demo it at your setting first.
- **Growth is all around us**. What are examples of good and bad growth? Is there any way you can encourage conversations about this with pupils?
- **Launch the poster competition** and let parents know about this. See page 39 of this pack for more details.

GROWTH

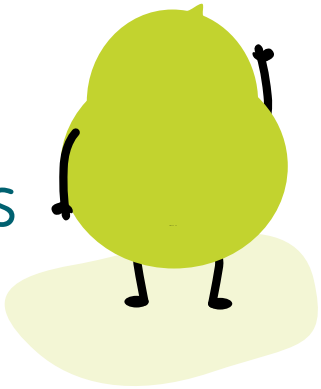


BRITISH SCIENCE WEEK 2022

MAKING THE MOST OF VOLUNTEERS



While face-to-face engagement with external visitors is now possible, don't forget that there are still opportunities to get volunteers and presenters to engage with students online.



STEM Ambassadors are volunteers who offer their time and enthusiasm to help bring science and technology subjects to life, and to demonstrate their value to young people. It is now possible to request both in-person and remote STEM Ambassador support, meaning that Ambassadors from across the UK can inspire young people wherever they are.

Find out more and make a request for STEM Ambassador support at **stem.org.uk/stem-ambassadors/find-a-stem-ambassador**.

You can also look for presenters and volunteers via *Science Live* (**sciencelive.net**) or ask parents if they work in STEM-related jobs to describe what they do in more detail.

You could also try some of the following things :

- **Kick off British Science Week with a career talk** or demo from from an inspiring volunteer to engage the pupils. The volunteer could highlight how they grew to be an expert in their field, or what significant contributions they have made to bring about that growth.
- **Schedule two or three different guests** for careers talks during the Week, if possible, to get pupils anticipating who the next guest will be and what they do. These sorts of experiences can inspire pupils to think about what they want to be in the future. Remember, they are never too young to explore their career options!
- **Where available, choose volunteers/ambassadors** who challenge stereotypes the pupils might have absorbed and promote positive attitude towards science, like female engineers. Let the volunteers/ambassadors share how their job is making a difference in the world, or an anecdote of a science activity they loved to do as a child.
- **Book your visitors early** (as many speakers get booked up during British Science Week). Have a clear idea of what you want them to do and communicate this with them ahead of time.

Volunteers come from a range of careers and experiences, from engineers, designers and architects to scientists and technicians, so get pupils looking forward to inspirational career talks which broaden their choices and develop their job interests!

Visit the *Inspiring the Future* website (**inspiringthefuture.org**) for some helpful ideas for using volunteers, some of which may be transferable when using remote engagement.

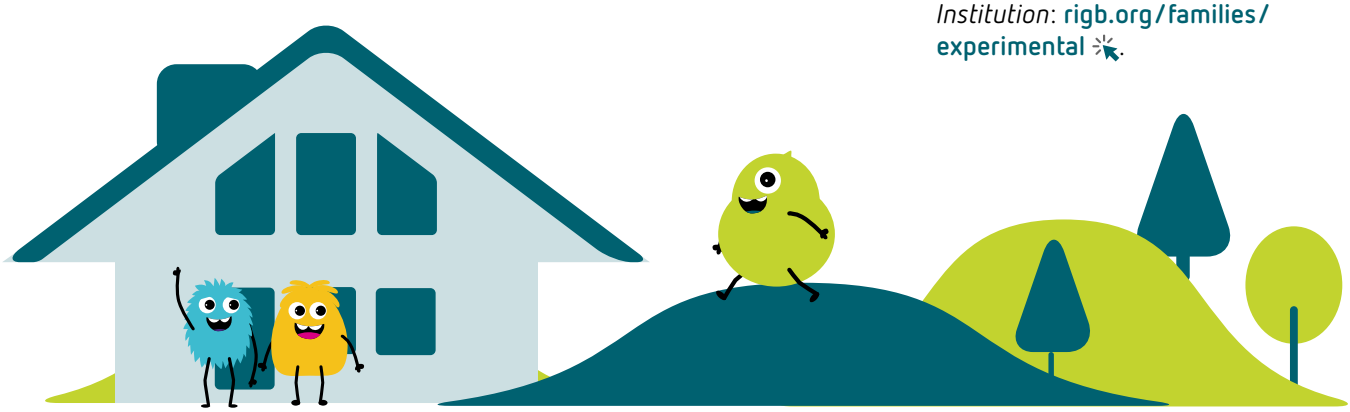
BRITISH SCIENCE WEEK 2022

BRITISH SCIENCE WEEK AT HOME

Do you want to help pupils carry on participating in British Science Week at home, but are not sure how? Here are our **top tips for engaging parents and carers** with the Week.

- **Make the most of parent newsletters**, the Parent-Teacher Association (PTA) and chat group and text messaging services if you have them. Let all the parents know at least a month in advance of the Week what you have planned, and how you'd like them to be involved. They might be able to collect or donate materials for use during the Week, and if you want them to get involved in any experiments at home they may need time to plan and collect materials themselves. The PTA may be able to support you financially to run activities during the Week or help to drum up parent volunteers.
- **Get parents thinking** about how their own jobs might link to STEM subjects and encourage them to chat with their children about this. You could do this via a newsletter or send pupils home with activities they can do with their parents, which may then lead onto further conversations.
- **Encourage exploring outdoors,** in the community or in local cultural spots. This could be anything from going on a nature walk around local parks, to spotting STEM in action on the streets around pupils' homes. Many of our CREST activities (collectionslibrary.crestawards.org/#5-11) are quick and easy to do as fun outdoor challenges too.
- **Send an experiment idea home** during the Week to perhaps spark mealtime discussions around science. Try to make it as low-resource as possible. It can help if it's something the pupils have tried or seen at school first so that they feel like the 'experts' when they do it at home with family, allowing them to lead the learning. We have a range of science-based home activities requiring few resources in the CREST at home collection at bsa.sc/CREST-Primary-Home-Collection.

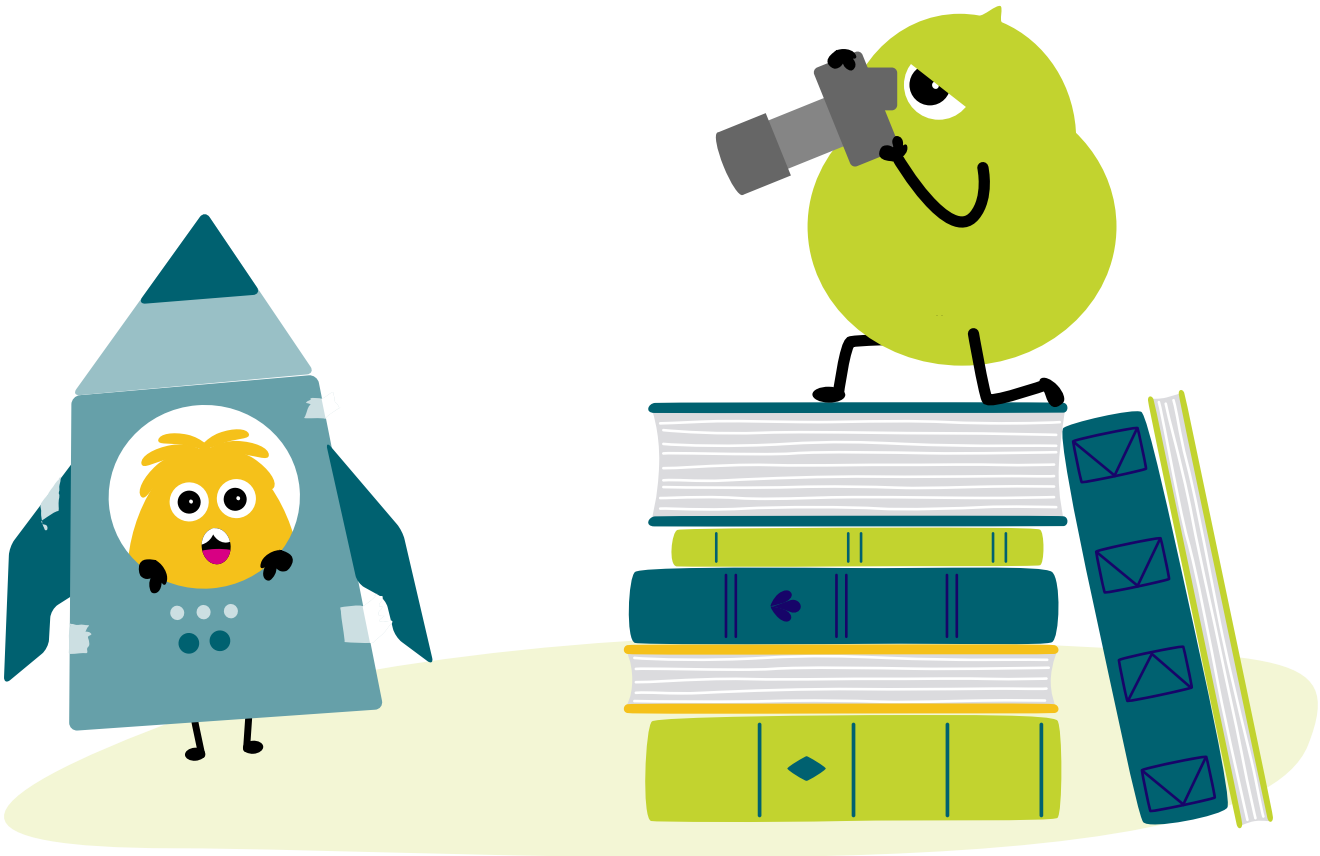
In addition to this pack, there are lots of other useful ideas for take-home activities from series such as this one from *The Royal Institution*: rigb.org/families/experimental.



BRITISH SCIENCE WEEK 2022

GATHERING RESOURCES FOR THE CLASSROOM OR HOME

- **If you can, try to collect materials all year round** that can be cleaned for use during British Science Week. Alternatively, check to see whether there is a scrap shop / store / club open in your local area. These places are often membership based and can be a brilliant, inexpensive or free resource for card, fabric and other bits of material. These things can be turned into rockets, cars, spaceships and more. You name it – the pupils will think of it! Look at childrensscrapstore.co.uk to find a UK directory of scrap stores.
- **Take photographs** when out and about and share these with the pupils to foster discussion and raise their level of understanding about the growth of plants, building structures and so on. The more colourful, the better! You can also use these photographs for the guessing game 'I spy', where you can describe your observation of growth and the pupils can attempt to guess it.
- **Collect story books** and reference books around the theme of 'Growth' to create a themed library.



BRITISH SCIENCE WEEK 2022

BEYOND THE WEEK

CREST AWARDS

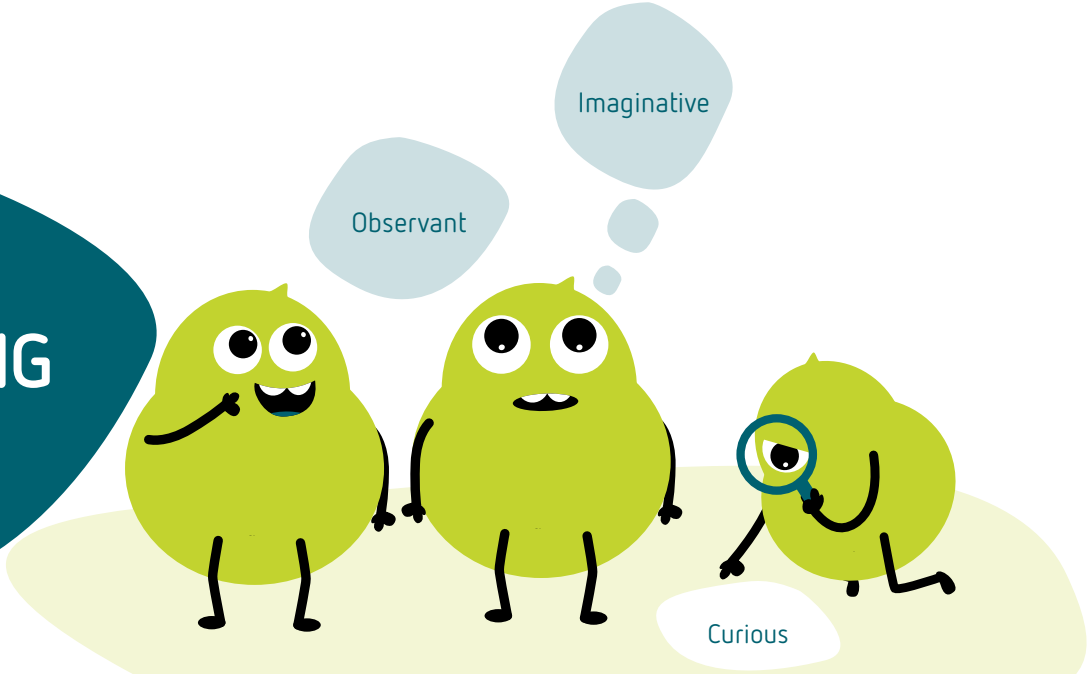
The exploration and curiosity don't have to end once British Science Week is over! Some of the following **ideas could help you to expand the learning** beyond the Week.

- **Get pupils to take part in a CREST Award.** CREST is a scheme that encourages young people to think and act like scientists and engineers. To achieve a CREST Award, pupils complete hands-on projects to suit their abilities, interests and age groups. Take a look at the different primary-level projects here: **primarylibrary.crestawards.org**.

- **If you have the opportunity, consider running a STEM club** or curiosity lab. You can find supporting resources at **stem.org.uk/stem-clubs**.

BRITISH SCIENCE WEEK 2022

UNLOCKING SKILLS



A fantastic way to **encourage pupils to take an interest in STEM** is to introduce transferable skills used by those working in STEM-related jobs.

These skills will strengthen positive attitudes and reduce stereotypes of those working in the field.

You could, for example, engage pupils in this *STEM Person of the Week* (nustem.uk/stem-person-of-the-week) activity from NUSTEM at Northumbria University.

Ask pupils to identify what attributes people working in STEM need. These might include being observant, creative, patient, good at communication, or curious. Look out for the skills set tags for each activity in this pack.

See the table below for the complete list of skills developed by NUSTEM to use as a talking point or to share with other teachers. Or, as a little bit of motivation, why not award each of the pupils with a sticker or certificate for a STEM skill which they demonstrate very well during the Week? You can download and print the stickers from britishscienceweek.org/british-science-week-marketing-pack.

Get pupils leading the way

A great way to encourage pupils' interest in STEM is by letting them lead the way. Here's how you can help them along.

- **Encourage pupils to run their own activities** during British Science Week. They could either run activities for other members of the class or run some CREST at home activities with their family, taking photos to present back to their class. Check out the CREST SuperStar activities for inspiration: collectionslibrary.crestawards.org/superstar-home-learning/63241423.
- **Get pupils to run their own CREST projects** and then use them as inspiration for a mini science fair in class. We have lots of handy CREST resources on our website: library.crestawards.org.
- **Ask pupils** to research how growth has influenced the way we live our lives today and then write a report for the school newsletter or website.
- **Encourage pupils to design and create their own display**, such as a display of scientists through time. This could be a photo exhibit that emphasises the diversity of scientists, and which helps to overcome the 'scientist in a white lab coat' stereotype.

Observant	Open-minded	Committed	Tenacious
Creative	Imaginative	Patient	Collaborative
Resilient	Communicator	Passionate	Organised
Curious	Self-motivated	Hard-working	Logical

BRITISH SCIENCE WEEK 2022

TREE TROUBLE

When any reasonably-sized tree grows, other living things also grow with it and live around it. This activity is designed to get pupils thinking about trees as habitats for other living things.

45 mins

Skill set: Communicator, observant, patient

Kit list

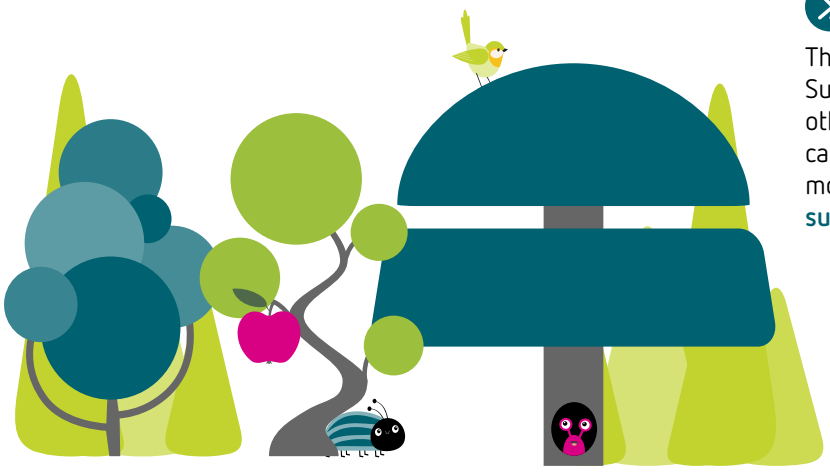
- Magnifying glass
- Binoculars
- Clipboard and pens or pencils
- Identification charts
- Computer for research

Instructions

1. Encourage the pupils to think about all the creatures they know that live in or near the trees, and whether this is the same for all types of trees. They may need help to find simple and accessible identification guides and books.
2. To get started with your investigation, here are some ideas:
   - See how much shade a tree makes and find out whether there are more plants and animals in its shade than in the open.
   - Use the internet to look up what types of plants and animals might live around a tree. By sitting quietly and watching the tree, you could see what types of animals come near it.
3. Discuss whether or not cutting down an old tree is a good idea and why. How would it affect plants, animals and people if an old tree was being cut down?
4. Help them to conduct their investigation and record their results. Their results could be recorded in a table or drawn.
5. Ask the pupils to creatively present their findings to the rest of the group.

Watch out

- Pupils should wash their hands with soap after handling the trees and any other living things.
- Remind pupils of the rules for handling living things and for safe working outdoors.



Next steps

This activity can be put towards a CREST SuperStar Award. There also are many other CREST SuperStar activities that you can try for free – simply follow this link for more information: crestawards.org/crest-superstar.

BRITISH SCIENCE WEEK 2022

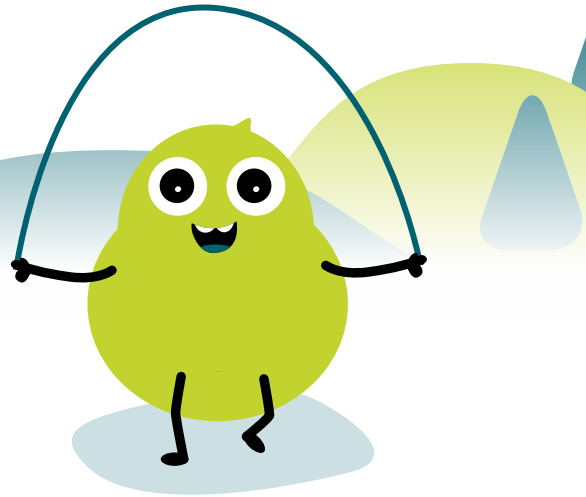
Take it home:

OUTDOOR GYM

Doing physical exercise is important for pupils' growth and development and brings a lot of health benefits for everyone. This activity is designed to get pupils thinking about the different ways that people can exercise outdoors, as well as more unusual ways to keep fit outside.

45 mins

Skill set: Observant, organised, patient



Kit list

- An outdoor environment (Including benches, steps and other objects)
- Camera (and other recording equipment)

Instructions

1. Familiarise the pupils with the activity. Set the scene by discussing great ways for people of all ages to exercise outdoors, like doing leg lifts from a park bench.
2. Allow pupils to use the internet or books to research different types of outdoor activity.
3. Encourage pupils to talk together about how to exercise using parts of your local area as an outdoor gym. Ensure that they think about safety.

   Here are some questions to help:

   - What can we use in the outdoor gym?
   - What types of exercises can we do?
   - How will these exercises help us to keep fit?
4. Help the pupils to record their survey in a table or similar.

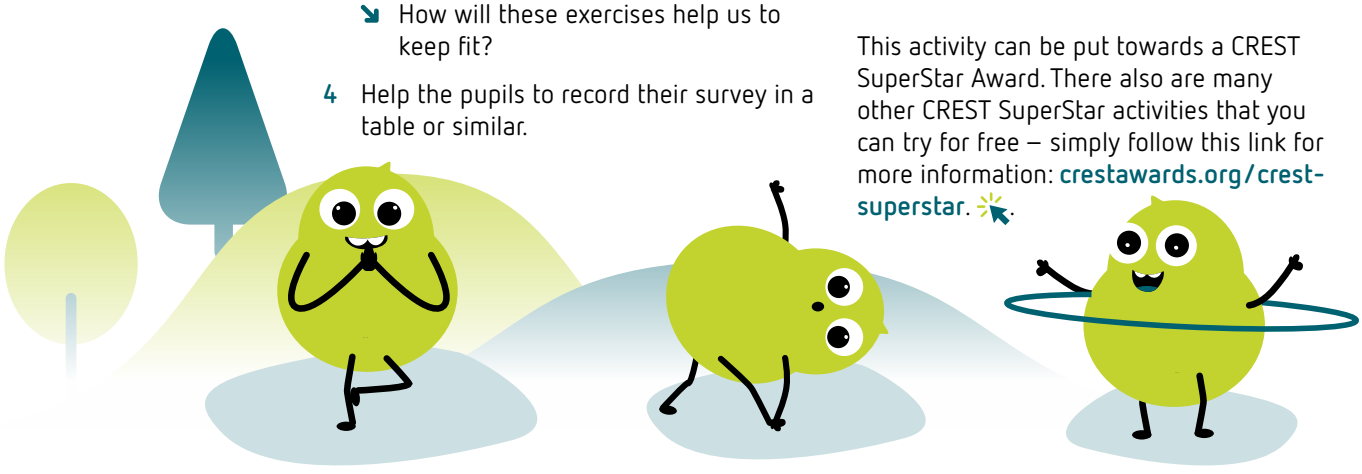
Watch out

- Ensure pupils wear appropriate clothing and sports shoes when exercising.
- Give pupils the opportunity to explain ideas to you before they test them out.
- Ensure that the area is safe and clean. Avoid hard or slippery surfaces.
- Ensure pupils try out activities that are appropriate to their age, size, fitness, and health.

Next steps

Perhaps you could start an outdoor gym club? Inspire the pupils to design a poster to encourage people to join in.

This activity can be put towards a CREST SuperStar Award. There also are many other CREST SuperStar activities that you can try for free – simply follow this link for more information: crestawards.org/crest-superstar.



GROW

Plants are all around us, and they're great! But have you ever wondered how plants grow and what might affect them? What are the best conditions to grow plants? Do different plants need different conditions? In this activity, you will measure the growth of onions to discover which variables affect growth.

3.5 hours (2 hours investigation setup + 5 minutes a day for 11 days recording results + 20 minutes final calculation on last day)

Skill set: Logical, observant, patient

Kit list

- Pupil recording sheet **teach.files.bbci.co.uk/terrificscientific/Grow_PupilRecording_Sheet.pdf**
- Spring onions with long roots
- One clear plastic cup/tumbler
- Cling film
- Sticky tack
- String
- Elastic band
- Scissors
- Access to tap water
- Syringe or small measuring cylinder
- Thermometer
- Trays to carry the cups
- Directional compasses

Instructions

1. Follow the video instructions to set up the spring onions here: **bbc.co.uk/teach/terrific-scientific/KS2/z6q47nb**
2. When measuring the growth of your onions, it's important to be precise. Try to do the measurements at the same time each day. Measurements must be taken to the nearest millimetre. Record the length of your onion (not including the roots) with the time you measured it on your sheet.
3. Every day at lunchtime, use a thermometer to record the outside temperature where your onions are. If you do not have access to a thermometer, you can use a smart phone app instead. Note the temperature on your sheet.
4. As scientific evidence of your investigation, you can take a photograph of your spring onion lying flat on a sheet of white paper.
5. Use a short length of string to measure the final circumference of your spring onion bulb at its widest point. Record this figure on your sheet along with the date.
6. Next, calculate how much your spring onion grew in length each day. Can you see a pattern between the growth of your onions and the daily lunchtime temperature measured? Graphs are a good way of spotting patterns.
7. Use the final lengths of each spring onion to calculate the average mean length of your onions. How much did your spring onion's growth vary from the others?
8. Next, calculate the average mean lunchtime temperature for the two week period. This mean temperature will tell you whether your spring onions were grown in cool, mild or warm conditions.

Watch out

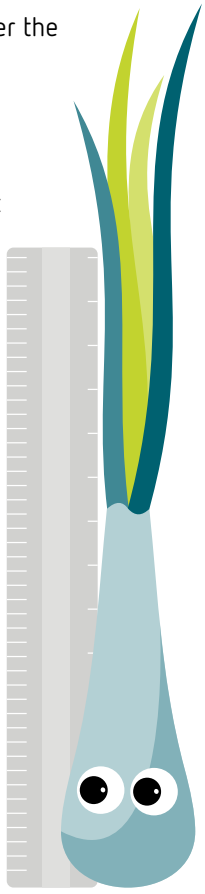
- As with all outside activities, you should check with an adult first. An adult can help you choose a suitable place to grow your onions.
- Do not participate in this activity if you have an allergy to onions – check with an adult if you're not sure.
- You should always take care when using scissors – ask an adult for help.
- Always wash your hands after the investigation.

At home

Now that you've discovered that different conditions affect the growth of plants, discuss ideas for how you could grow plants for super long space missions to provide astronauts with food. Where might we get water in space to water plants? How might we get enough light to grow seeds?

Career options

The skills you've learned here will be useful for lots of different jobs. You might come up with a new way to prevent food waste, you could design your own automatic plant watering device, or you could revolutionise the way plants are grown!



BRITISH SCIENCE WEEK 2022

British Society for immunology

ANTIBODY AND VIRUS ORIGAMI

If you're infected with a virus, your body is ready to fight using antibodies which stick to a virus and encourage immune cells to attack and destroy. We grow specific antibodies during an infection or after vaccination. In this activity, you can fold an antibody, build amazing virus-like sculptures with origami and celebrate your amazing body.

15 minutes

Skill set: Imaginative, patient, resilient

Kit list

Any square paper!

Instructions

1. Origami takes time and patience. Look carefully at the pictures on the next page and think of this as a puzzle. If you're stuck, watch our video immunology.org/origami-antibody-virus.
2. If your paper is not square to begin with, follow the instructions on how to make a square paper.
3. Now it's time to make an origami antibody.
4. When you have finished the antibody, it is time to build amazing virus-like sculptures. Viruses can make us unwell. They are tiny and have a spiky outside and instructions inside to make more viruses (DNA or RNA). Thankfully our immune system makes antibodies to stop viruses. Vaccines encourage your body to grow lots of antibodies so you can be protected from future infection.
5. Look carefully at the diagrams for the virus origami. If you get stuck, look at immunology.org/origami-antibody-virus.

Watch out

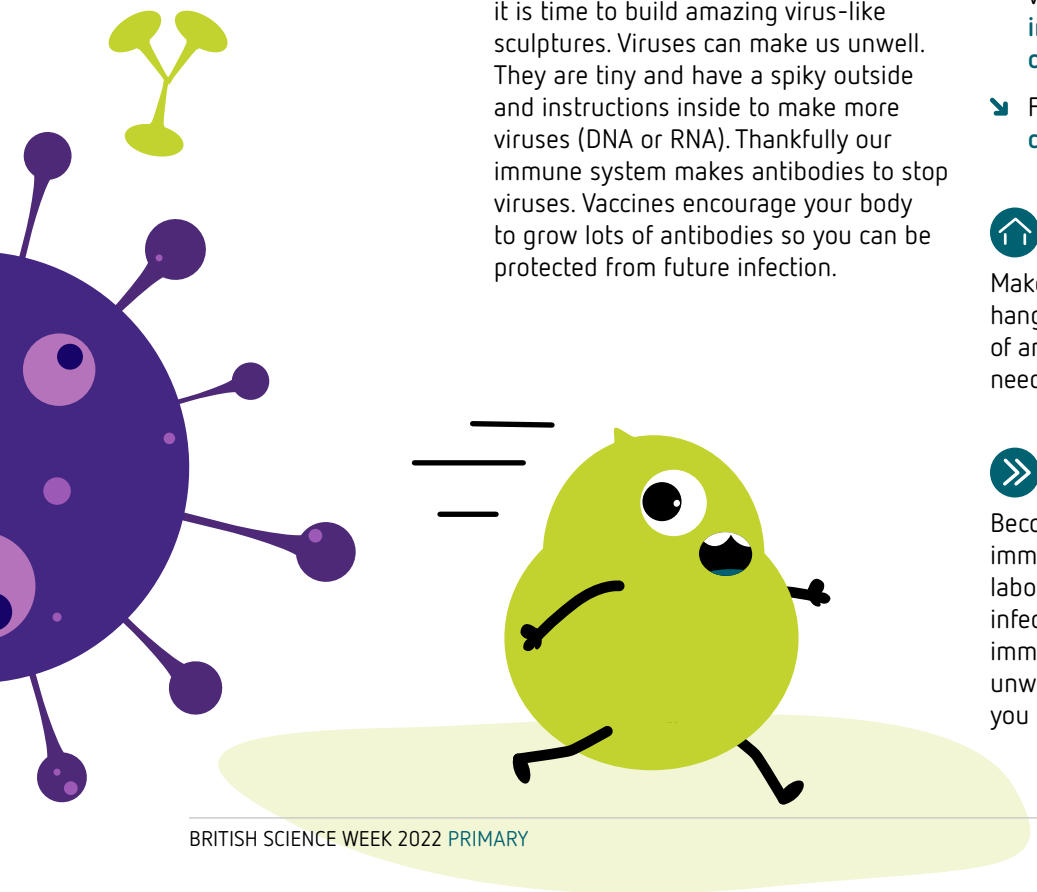
- Find out more about your immune system with the British Society for Immunology and discover 'Our Heroic Bodies' - illustrations of immune cells, bacteria and viruses to add colour to while learning: immunology.org/celebrate-vaccines/our-heroic-bodies.
- Find out more about how vaccines work at celebratevaccines.com

At home

Make a collection of colourful antibodies to hang as decorations. Do you know the names of any viruses or bacteria that your body needs antibodies to protect against?

Career options

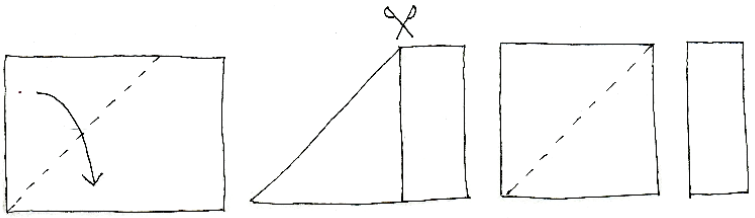
Become an immunologist to study the immune system. You could work in a laboratory, developing vaccines against infectious diseases. Or become a 'clinical immunologist' – doctors who help patients unwell in hospital. If you enjoy origami maybe you could become an engineer.



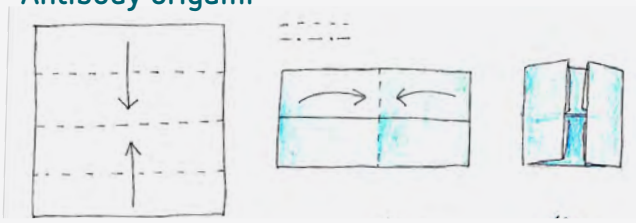
ANTIBODY AND VIRUS ORIGAMI
ACTIVITY SHEET

British Society for immunology

To make a square from A4, take a top corner down to line up with the bottom to make a sharp point and remove the rectangle.

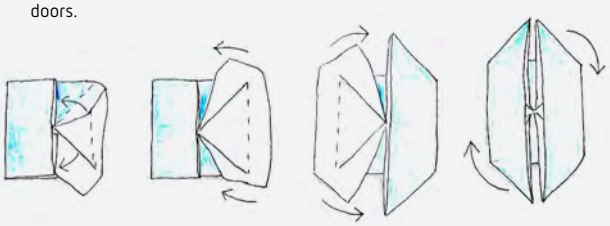


Antibody origami



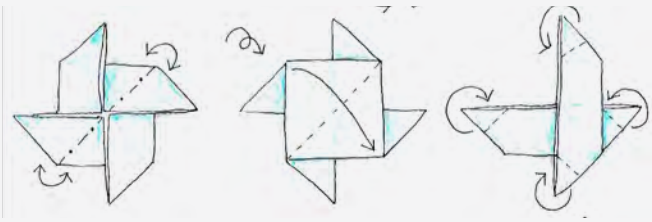
1 Fold your square in half, open it and fold the outsides to meet the line you created, like double doors.

2 Keeping the 'doors' closed repeat again – fold in half, open & bring outsides to the middle to make a square.



3 Open one door and make two diagonal folds from the centre of the inner square to the corners. Flatten down to make points. Repeat on other side.

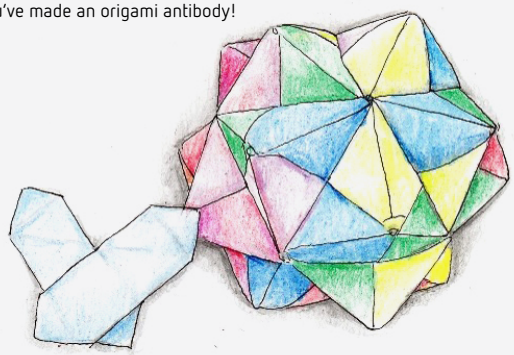
4 Fold over opposite points to make a 'windmill'.



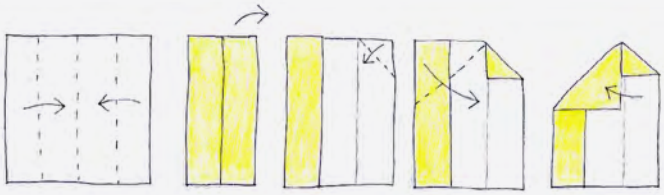
5 Turn the 'windmill' over to the smooth square. Fold along the diagonal and flip out the top and bottom 'windmill' arms to make a 'Pac man'

6 Crease the four points, open them up and tuck into the pocket between the folds.

7 You've made an origami antibody!



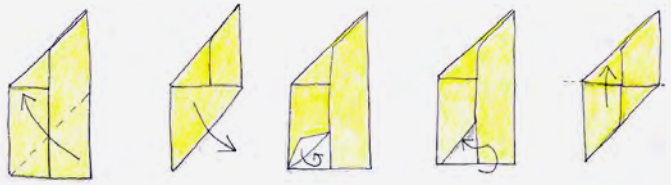
Virus origami



1 Fold your square in half, open and fold the outsides to the middle, like double doors.

2 Open the right 'door'; fold the top right corner down to the quarter crease to make a triangle.

3 Bring the left 'door' down to meet the triangle and close the right side.



4 Bring the bottom right corner to the line.

5 Open and a 'tongue' appears - tuck it underneath.

6 Take the bottom right and slide it under.

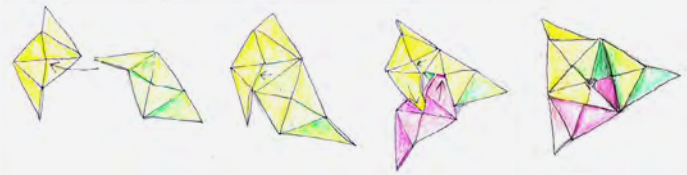
7 Fold up to make 'bunny ears'.

8 Take the smooth side and fold the top point down.

9 Turn over and repeat.

10 Open to reveal a zig-zag shape with two pockets in the middle. You have made one unit for building!

You can now get building! The point of one will plug into the pocket of the next. 3 units connect to form a strong triangle.



3 units

6 units (cube)

12 units (octahedron)

30 units (dodecahedron)

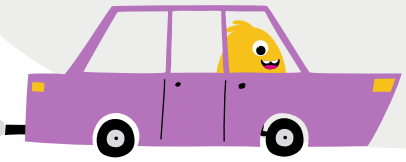
Different numbers of units create different shapes.
Many viruses look like the final one with pentagons on each side.

BRITISH SCIENCE WEEK 2022

DETI DIGITAL ENGINEERING TECHNOLOGY & INNOVATION

WECOUNT

WeCount TO GET ABOUT



This activity allows pupils to understand what climate change is and the impact of road transport on emissions. Pupils will zoom in on how their journeys can impact emissions. Will there be growth in the number of people who walk, cycle and scoot their way around their towns and cities in the near future?

1 hour

Skill set: Committed, imaginative, observant

Kit list

Printed Google maps of the school and surrounding roads on an A4 piece of paper.

Allow space around the map for a key and beneath the map to write your challenges.

A tally chart on a flipchart/whiteboard with separate columns for cars, pedestrians, cyclists and heavy vehicles.

Instructions

1. Consider the following questions: What is climate change? What activities contribute to climate change? How might we reduce the emissions we produce? Read the fact sheet on the next page to find out more.
2. Using your maps, draw your route to school, including any obstacles that made your journey longer or more dangerous. Include a key and write any challenges faced on the route. Discuss why you take different transport to school.
3. Watch this video **bsa.sc/YouTube-traffic-survey**. Count the number of pedestrians, cyclists, cars and heavy vehicles. Nominate one pupil to tally the answers, as the rest of the class calls out the transport mode. Explain how this is an example of manual traffic counting. Now we will look at digital traffic counting, taken by citizens across Europe using sensors.
4. Head to: **//telraam.net/en**. Zoom out to Europe to show the number of active sensors. Zoom in to a particular location (an active street near your town/city if possible) and click 'more data'.
   - Which type of transport is the highest for this street? E.g., bike lanes, footpaths, signage, etc.
   - How might the street design affect this?
5. Scroll down to 'overview per day'.
   - Which day(s) have the most amounts of traffic?
   - What times of day are busiest? Why might that be?
   - What changes do you think need to be made on this street to make them more people-, bike- and scooter-friendly
6. Brainstorm local solutions that can reduce transport emissions near your school. Work in groups and share ideas with the class. Agree on the most feasible and effective solutions. Then design posters to share with fellow pupils.

Next steps

- By completing this activity, your school could be working towards Modeshift STARS accreditation. Find out more and sign up at: **modeshiftstars.org/education**.
- WeCount is a Horizon2020 funded citizen science project under grant agreement 872743. Find out more at: **we-count.net**
- The initiative for Digital Engineering Technology and Innovation (DETI) aims to show how digital technology can be used to engineer a better world. Find out more at: **digitaltrailblazers.co.uk/about**.

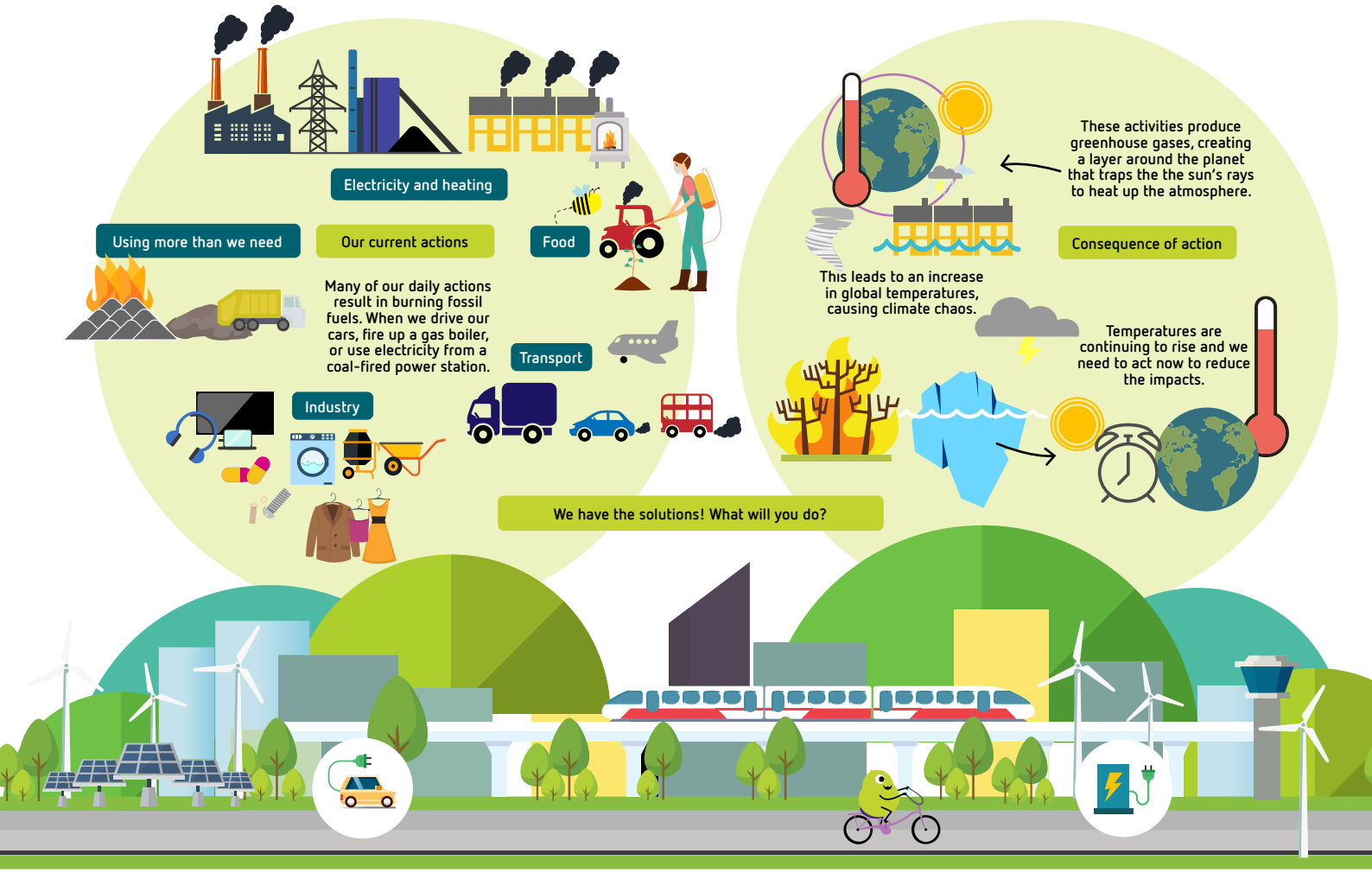
At home

Choose a few people you could interview and ask: would you like fewer cars on the road, and why? For example, your parents, grandparents, teachers or shopkeepers. Write up answers, ready to share next week.

Career options

Engineers find solutions to problems. We now understand that we need to reduce car travel, but some street designs do not help people feel safe to walk or cycle. Maybe you would like to be a traffic engineer who monitors our journeys to see how they can improve the design of our streets, to make it easier for us to get about safely?

WE COUNT TO GET ABOUT
CLIMATE CHANGE: THE CONSEQUENCES OF OUR ACTIONS



Above:
Image adapted from original by ClairCity Project

claircity.eu/wp-content/uploads/2020/05/CC-infographic.png.

Climate change is caused by greenhouse gases trapping heat in the world. The greenhouse gases are released when fossil fuels are burnt and produce emissions. For more resources, visit: together-for-our-planet.ukcop26.org/schools-pack-resources.

About a quarter (27%) of the UK's carbon emissions come from transport, as well as being the main source of toxic air pollution. And our car use has doubled since the 1980s. To reduce the impact of climate change, we need to reduce our emissions. So we need to shrink our car use, and grow how much we walk and cycle about. Think about transport – how we get about from our homes and to our schools – and solutions to reducing emissions.

Technology can help us better collect traffic data – this is digital engineering. Speed cameras for example, measure vehicle speeds. Other sensors measure air pollution particles in the air, while others count the number of different types of transport, like pedestrians, cars and bikes. People across Europe are currently counting traffic from their homes so they can use this evidence to reduce the number of cars and increase the number of cyclists, scooters and pedestrians.

How can we help people walk or cycle more locally?

BRITISH SCIENCE WEEK 2022

SURVIVING ON MARS

Growth is one of the signs of life. Mars rovers are being used to explore the possibilities of life on Mars, also known as the red planet. In this activity, you will be designing an animal that could survive on Mars. What would it look like?

30 minutes

Skill set: Creative, imaginative, tenacious

Kit list

- Modelling materials (clay/Plasticine)
- Modelling oddments such as buttons, paper straws, pipe cleaner, etc. (optional)
- Paper and pencils for design sketch (optional)

Instructions

1. Think about the needs of all living things on Earth. What additional characteristics would animals need to survive on Mars – can you design an animal that could survive on the red planet?
2. Before making your model, here are some things to consider:
   - What do we know about the temperature on Mars? What characteristics would help your creature to live in these cold temperatures?
   - What do we know about the Martian landscape? What would a creature that lived here look like?
   - What could the Martian creature eat?
   - Is there more or less gravity on Mars - how would a Martian animal have to be different to an animal on Earth?
3. Work in teams for 15-20 minutes to build your creations.

Watch out

- Wash your hands after building your creations.

Next steps

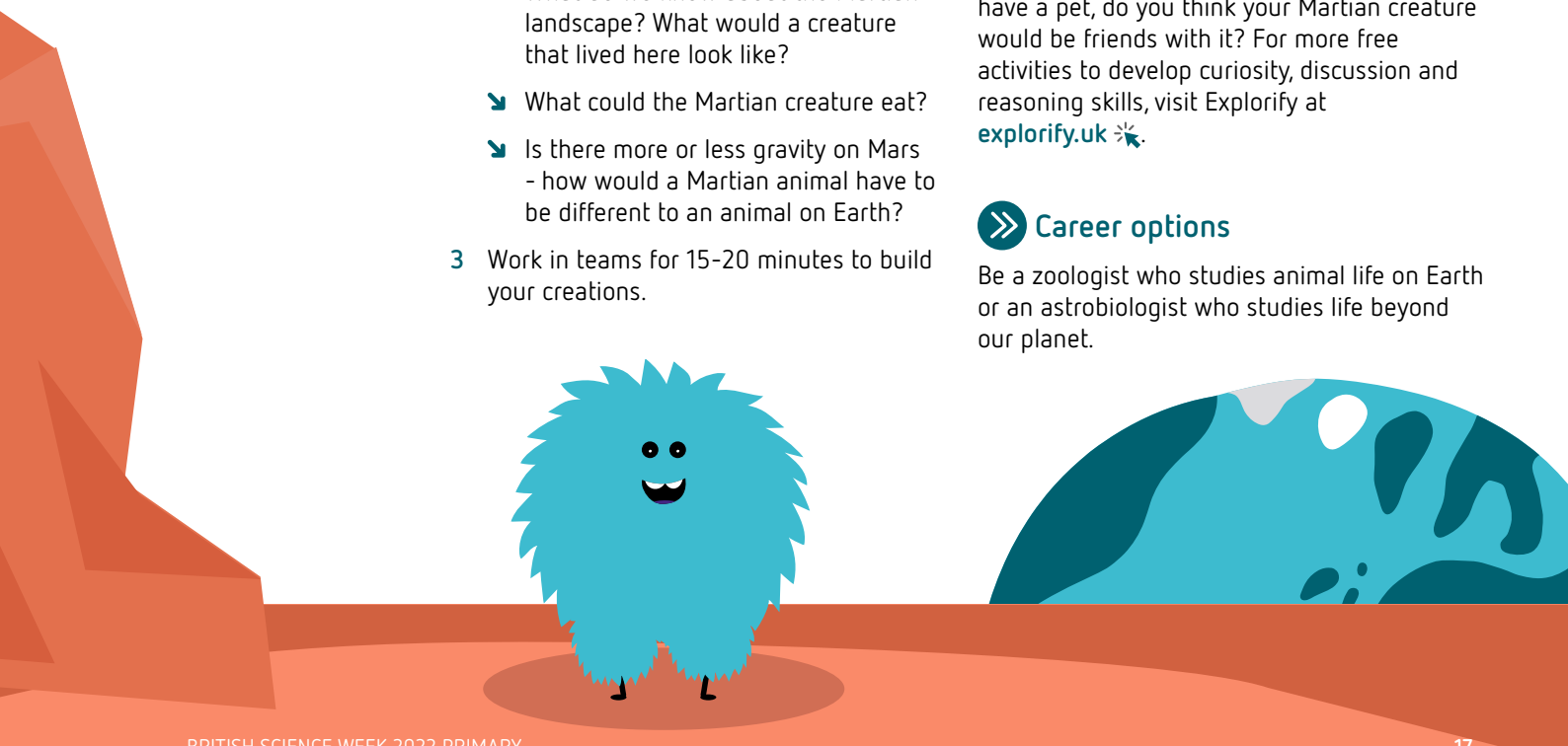
The ExoMars Mission is looking for signs of life using the Rosalind Franklin rover, find out more: **explorify.uk/teaching-support/whats-new/go-to-mars-with-explorify**.

At home

Tell your grown-up about your creature. If you have a pet, do you think your Martian creature would be friends with it? For more free activities to develop curiosity, discussion and reasoning skills, visit Explorify at **explorify.uk**.

Career options

Be a zoologist who studies animal life on Earth or an astrobiologist who studies life beyond our planet.



BRITISH SCIENCE WEEK 2022

dreamachine

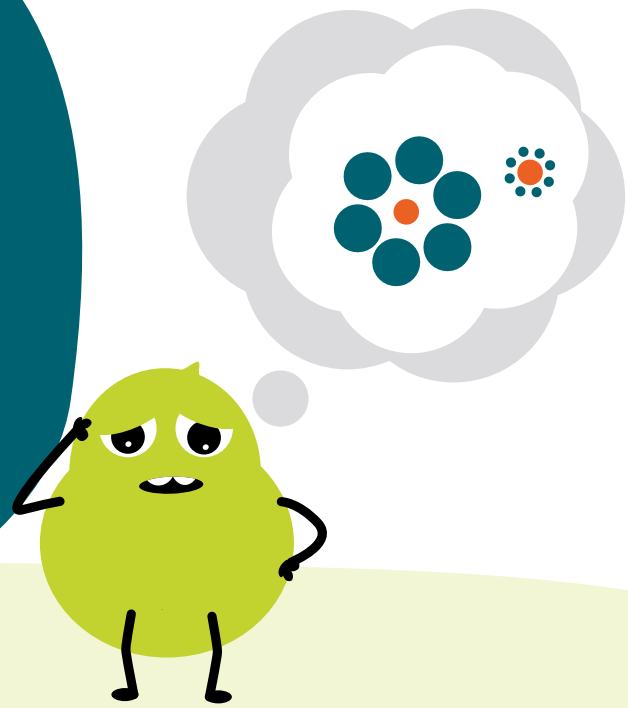
LEARNING UNBOXED CREATIVITY IN THE UK

DREAMACHINE: SEEING WITH OUR BRAIN!

This starter activity is linked to Dreamachine, an artwork exploring the power of our minds and how we see and experience the world around us differently. Our brains use rules and guesses so we can understand what our growing bodies sense. In this activity you will explore some optical illusions and make your own, known as the Müller-Lyer illusion.

15 minutes

Skill set: Creative, curious, open-minded



Kit list

- Scissors
- Ruler
- Paper
- Pen

Instructions

1. Look at the optical illusions on the next page.
2. For the Jastrow Illusion, which shape is longer, A or B? They are both the same size! Test it by cutting out the shapes and swapping them over. Which looks bigger now? Place one on top of the other to check.
3. Look at the Ebbinghaus Illusion. Which orange circle is bigger? They are both the same size! Test it by lining up edges of paper along the top and bottom of the orange circles.
4. Did they trick you? Your brain is very busy trying to understand all the information from your senses, so to cope, it makes some assumptions based on your memory and experience. Usually, these assumptions allow us to see the world more-or-less as it is, but sometimes they lead to illusions.
5. Now have a go at making your own optical illusion to test the brain's perception of size. Follow the instructions on the next page.
6. Think about:
   - Why do you think our brains make guesses about what we see?
   - Does this make you think that what you see is unique to you?
   - How do you think this might relate to other ways you encounter the world?

Next steps

- This is just for starters! Explore a range of optical illusions and perception explorations through the Dreamachine resources, a major schools programme for 2022 focused on our sense of self, how our brains help us perceive the world and how we connect to others. dreamachine.world.
- Check out illusionsindex.org for more illusions

At home

Show family and friends the illusions. Does everybody see the same things?

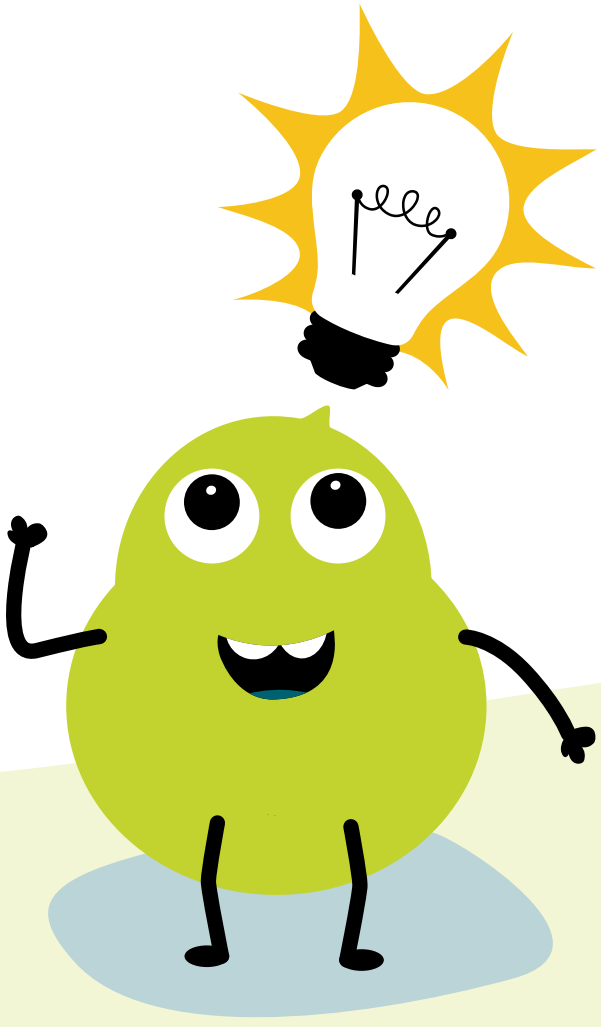
Ask each other about why some people see

DREAMACHINE: SEEING WITH OUR BRAIN!

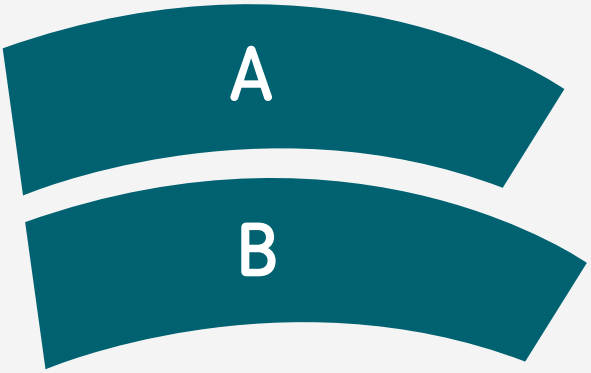
things differently to others. Ask them whether they can think of other examples of this happening.

Career options

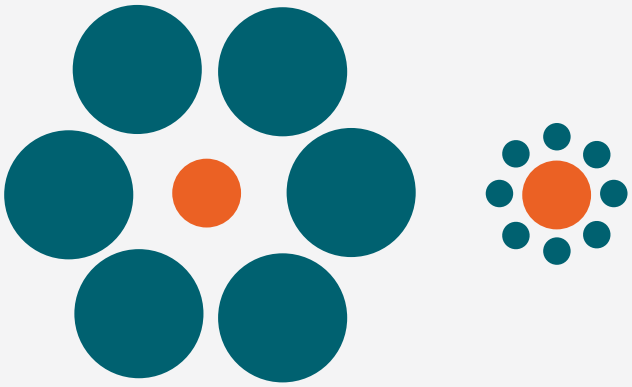
Neuroscientists and psychologists study the nervous system, the brain, and the mind in order to help advance science, medicine, technology, and society. Philosophers study the nature of mind and experience, among many other things. By knowing about how we experience illusions, people working in these areas can learn more about perception. Artists, filmmakers, designers, and architects often play with colour, perspective, and illusion.



Jastrow Illusion



Ebbinghaus Illusion



Have a go!

1 Draw two lines the same length using a ruler, one below the other.

2 On the ends of the top line add sideways V shapes.

3 On the end of the other line, draw arrow heads.

4 Which line looks longer? Why do you think this is?

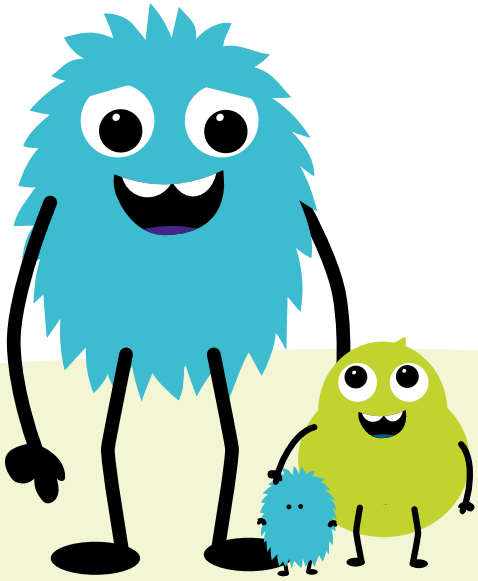
BRITISH SCIENCE WEEK 2022

DO ALL OUR BODY PARTS GROW AS WE GET OLDER?

As we age, our bodies change. In this activity, you will investigate questions about how your bodies grow. Do all body parts grow as we get older?

45 minutes to 1 hour

Skill set: Collaborative, observant, organised



Kit list

- Sets of cardboard hand shapes in four. (Evenly graduated sizes labelled 'very small', 'small', 'medium' and 'large'. One set of four per pair of pupils.)
- Resource sheets
- Stickers

Instructions

1. Do all body parts grow as we get older? What body parts would it be easy for you to measure to find out? Discuss.
2. Pair up and use a set of four cardboard hands
3. Each pair use the different sizes of cardboard hands to decide which is the closest match of each pupil they are 'measuring'. Use the comparing hand size table on the next page to record your data.
4. Using different sticker sets, plot your data onto the scatter graph.
5. Discuss what the graph shows. Write a sentence on resource sheet 1 about the data pattern you have found. Reflect:
   - What have we learned about how we grow as we get older?
   - Do we keep on growing?

Watch out

Be conscious of any physical differences in pupils within the class you are working with. Ensure the activity you choose includes everyone.

Next steps

- Investigate other body parts such as: Do older pupils have bigger feet? Do older pupils have longer arms? Do older pupils have a larger head circumference? Divide your class up into smaller groups and ask each group to investigate different body parts.
- A shared discussion at the end to compare the range of scatter graphs could provide concrete data across a range of body parts to answer the original question – do all our body parts grow as we get older?
- Inviting older or younger pupils than the class you are working with to be measured will add reliability to the data set.

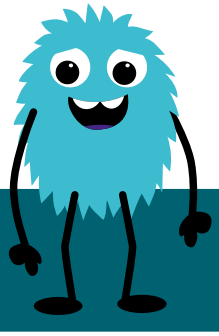
At home

Record the shoe sizes and ages of people who live in your home and share this data on a larger scatter graph. You might also ask adults if they can recall what age they were when their feet stopped growing.

Career options

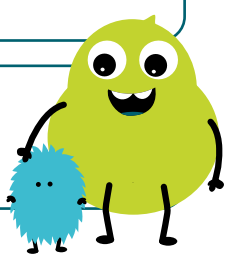
Careers linked with body growth could include anatomy, physiology, and general practitioner in the the medical profession. A sports scientist, masseur or athlete with a sporting profession may have an interest in how our bodies grow. For example, knowing the impact of larger feet or longer legs on how far you jump are very important to a long or high jumper.

DO ALL OUR BODY PARTS GROW AS WE GET OLDER?
RESOURCE SHEET 1



COMPARING HAND SIZE TABLE

AGE (YEARS)	HAND SIZE
4	
5	
6	
7	
8	
9	
10	
11	



DO ALL OUR BODY PARTS GROW AS WE GET OLDER?
RESOURCE SHEET 2

Comparing hand size scatter graph

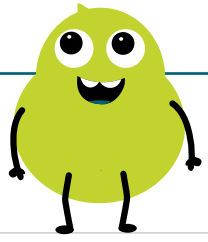
HAND SIZE

LARGE								
MEDIUM								
SMALL								
EXTRA SMALL								
	4	5	6	7	8	9	10	11

AGE (YEARS)

Conclusion:

What pattern did you find?



BRITISH SCIENCE WEEK 2022

Leeds Museums & Galleries

BUILD A WORKING ROMAN GROMA

The Romans built incredibly straight roads between towns and cities in Britain, but how did they manage this without the technology we have today? This activity involves building a groma, the surveying instrument used by the Romans to plot the most direct line between two places, even when there was no line of sight between them.

30 minutes

Skill set: Hard-working, logical, organised

Kit list

- Corrugated plastic sheet or thin balsa wood
- 1 metre length dowelling
- Pencil
- Ruler
- String
- Scissors or craft knife
- Adhesive
- Split pin
- Awl
- Blu-tac
- Cutting board

Instructions

1. Cut two 40cm x 4cm strips from the plastic sheet / balsa wood.
2. Use an awl to punch a hole half-way along the strips. These are the arms of the groma.
3. Fix the strips together at right angles, forming a cross shape. Make sure the holes line up.
4. Punch a small hole at the end of each arm of the cross. This will be to attach the string.
5. Cut out one 10cm x 4cm strip from the plastic sheet / balsa wood.
6. Punch a hole at both ends of the strip.
7. Use the split pin to attach the cross shape to one end of this strip. Make sure the cross can rotate.
8. Thread the long dowel through the hole in the other end of the strip. Use blu-tac to prevent the arm slipping down the dowel.
9. Cut four 30cm lengths of string.
10. Attach one end of each string to the end of each cross arm, and a small blob of blu-tac to the other end of each strings to act as a weight.

Watch out

- Adult supervision is recommended if using a craft knife to cut balsa wood, and when using the awl. Make sure to use a cutting mat and keep fingers away from the blade.
- When using the awl, place the strips on a flat surface and on top of a cutting board and press directly down with the awl.
- If using corrugated plastic sheet, make sure the corrugation runs along the length of the strips to help keep them rigid.
- Refer to CLEAPPS guides P029 and P028 for more guidance on safe cutting and use of an awl. Find them here: science.cleapss.org.uk/Resources/Student-Safety-Sheets

Next steps

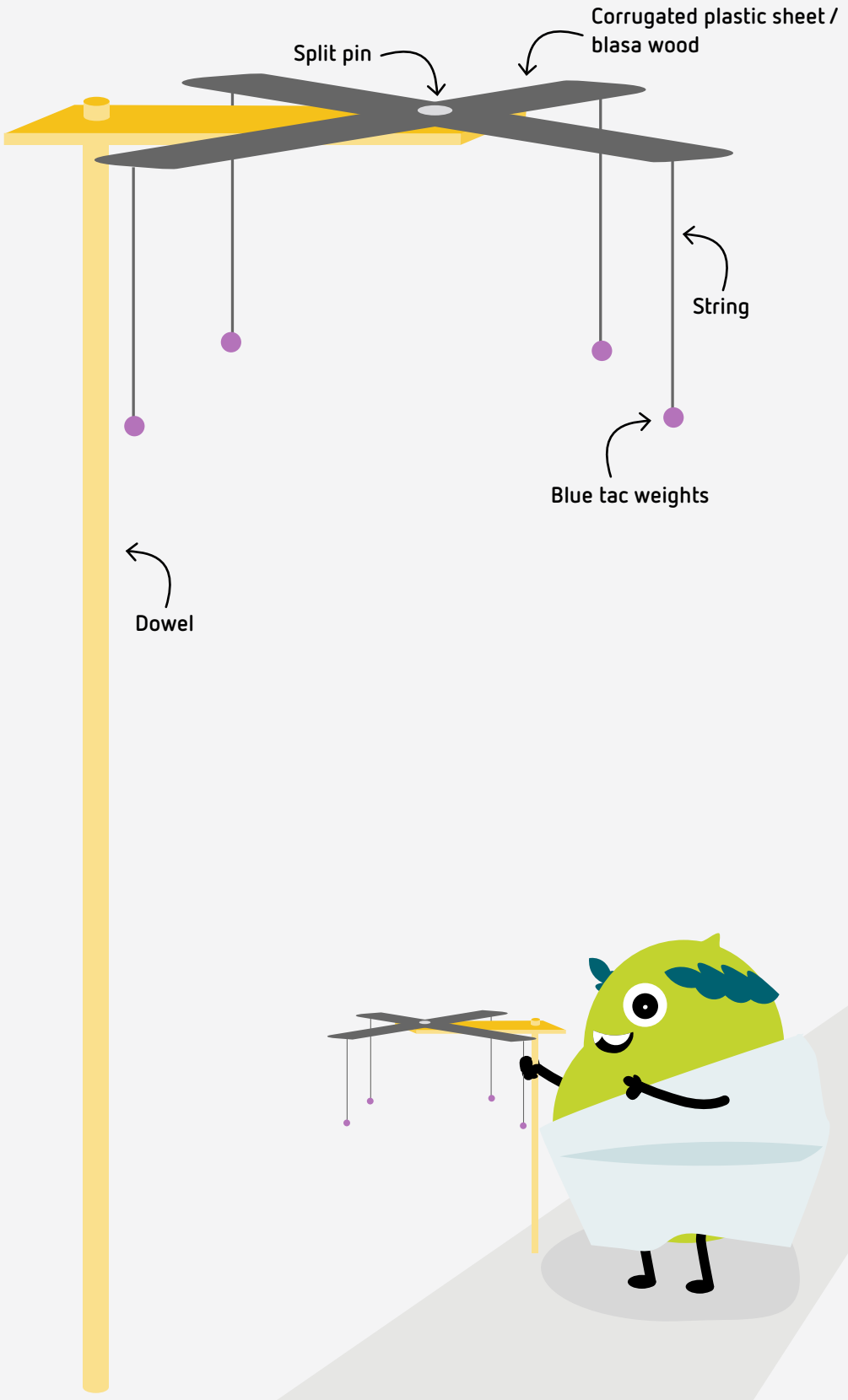
Go to MyL earning.org and type 'groma' into the search bar to find a supporting learning resource, including how to use the groma.

Challenge pupils to plot a straight line between two points, or use a groma to plan out parallel race tracks, or plot a sports court / pitch.

Career options

Surveying instruments aid surveyors in their line of work. In this field, you can be a land/geomatics surveyor, a quantity surveyor or a building surveyor.

BUILD A WORKING ROMAN GROMA
ACTIVITY SHEET



BRITISH SCIENCE WEEK 2022

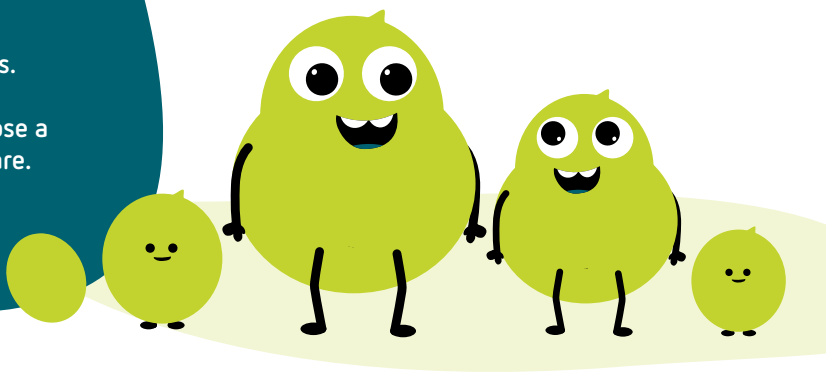
NFU EDUCATION

COMPARING ANIMAL LIFECYCLES

In this activity, you will be exploring animal lifecycles. Follow along with the live lesson to learn about the lifecycle of a sheep, cow and chicken, and then choose a fourth animal of your own to investigate and compare.

45 minutes

Skill set: Curious, observant, open-minded



Kit list

- Lifecycles comparison resource
- Science Farm LIVE! lesson
  Sign up at **nfueducation.com**
- Scissors
- Glue
- String or wool (optional)

Instructions

Join in with NFU Education Science Farm LIVE lesson (Sign up at nfueducation.com) to witness the lifecycle of a sheep and cow before your very eyes and ask the experts all your questions.

Visit the NFU Education's social media pages (see Next steps) for updates on the lifecycle of our chickens.

Fill the lifecycle comparison resource with everything you discover during the live lesson and on NFU Education's social media. Add as much information as you can:

- How long is the lifecycle in total?
- How long is each stage?

1. Research another animal of your choice and add it to your lifecycle comparison resource. Why not find out about an amphibian or insect's lifecycle?
2. Compare the lifecycle you have studied.
   - What do you notice?
   - How are they different?
   - How are they similar?
   - Which is the longest / shortest lifecycle?
3. You might like to cut each lifecycle into long strips and glue the ends together to make 3D rings. This demonstrate how lifecycles are a continuous, circular process. You might then like to hang your lifecycle rings up in your classroom or home using string.

Watch out

- Be careful when using the scissors.

Next steps

Join in with the NFU Education's other Science Farm LIVE lessons that will be streamed during British Science Week. Sign up at nfueducation.com.

Follow the lifecycle of the NFU Education's chickens on their social media platforms: @NFUEducation on their social Twitter and facebook.com/NFUschools.

Career options

The diverse and rapidly changing world of food and farming has thousands of fantastic STEM career opportunities. Whether you are interested in robotics, animal welfare, engineering, horticulture, business or food technology, there is a career for you. Visit: fginsight.com/thisisagriculture.

Animal	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	
						Glue here
						Glue here
						Glue here
						Glue here

BRITISH SCIENCE WEEK 2022

HOW TO CALCULATE THE AGE OF A SHARK

Scientists have shown that the length and age of a shark are linked. They used a graph (age versus length) to estimate the age of other sharks. The longest shark was estimated to be 392 years old! In this activity, you will determine if height is a good measure of pupils' ages in the class.

30 minutes

Skill set: Collaborative, organised, open-minded

Kit list

- Tape measures
- Date of birth (for each member of the class/group)
- Calculators
- Pencil
- Paper
- Ruler
- Graph/squared paper or computers for plotting graphs

Instructions

1. You could do this activity as a class or work in smaller groups of about 10. You are going to collect two sets of data from each person in the group and put all this information on a graph.
2. Work out your age in months.
3. In your group, decide how you will measure everyone's height. Which units will you use? It is important that you all agree.
4. Measure your height using a tape measure. You may need a friend to help you!
5. Record everyone's age and height in a table.
6. Plot everyone's data on a graph (age on the x-axis, height on the y-axis). You could do this on your own or as a group.
7. Try to draw a straight line through the points on your graph.
8. Measure the height of another pupil (not in your group/class). Can you use your graph to predict their age?

Watch out

- Be careful when measuring someone's height, especially if they are taller than you are. It might be sensible to ask each person to lie on the floor next to the tape measure.

Next steps

To find out how research scientists measured the age and length of Greenland sharks, you might like to read *I bet you didn't know... How to calculate the age of a shark:* pstt.org.uk/application/files/7015/5903/4027/1_CER_article_sharks_aut_2017.pdf.

You can find out more about cutting-edge science research projects and what research scientists do here: pstt.org.uk/resources/curriculum-materials/cutting-edge-science-primary-schools.

At home

Can you use your graph (you may need to extend the line) to predict the age of family members? Does this produce any interesting results?

Career options

The scientists who studied the sharks were interested in living things in the sea (marine biology). A career in marine biology is perfect for someone who is interested in the environment. You might study large animals or smaller organisms like bacteria. Find out more about marine and environmental research here: pstt.org.uk/application/files/6015/9128/4220/Whale_song_Spring_2020_Newsletter.pdf.

BRITISH SCIENCE WEEK 2022

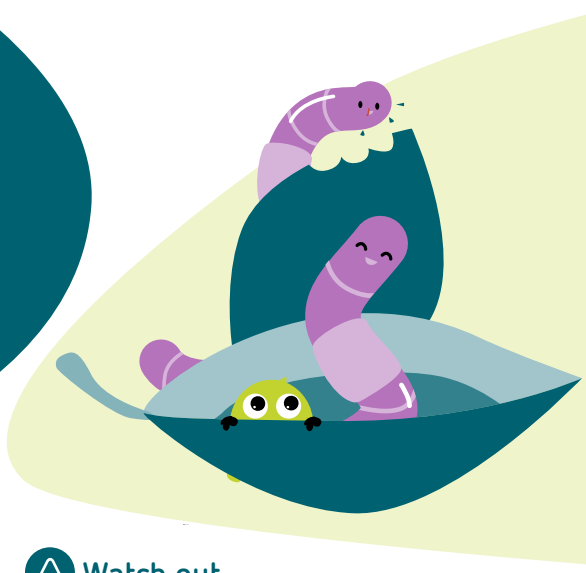
Country Trust
Where children learn and grow

WONDERFUL WORKING WORMS

Worms are incredible recycling engineers, creating super soil for everything that grows, including trees, flowers and all the foods we eat. In this activity, you will use your senses to explore the soil in your garden, school or local park and learn about the hidden world of wonderful, working worms.

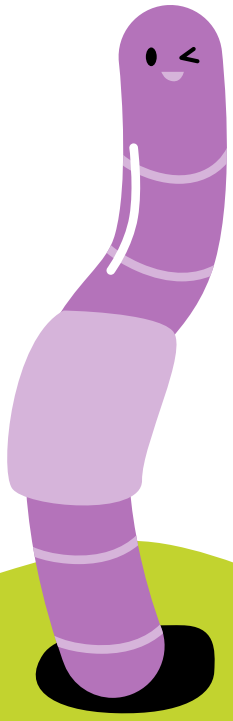
20-30 minutes

Skill set: Curious, observant, patient



Kit list

- Spade, trowel or a sturdy spoon
- Tray or pot
- "The Three Types of Earthworms" sheet
- Spray bottle of water or some big leaves



Instructions

1. Use the "Three Types of Earthworm" sheet on the next page to decide where to look for worms.
   a. Under logs, stones, trees or hedges for surface dweller worms
   b. In flower or vegetable beds for earthworker worms
   c. On lawns or playing fields, where worm casts are evidence of deep burrowing worms
2. Use your spade, trowel, spoon or hands to explore the leaf litter and dig the soil.
3. Carefully place worms in the tray for a closer look. Keep them cool with a light spray of water or give them leaves to hide underneath.
4. Get curious:
   a. How long is your worm?
   b. What colour is your worm?
   c. What type of worm have you found?
   d. How does your worm move?
   e. Has your worm done a poo? Worm poo is plant fertilizer and makes plants grow!
5. Put the worms back where you found them, so they can keep recycling and making super soil for plants to grow.

Watch out

- Dig carefully
- Wash your hands after touching worms and soil.
- Look out for any litter, glass or sharp items where you are searching.
- Ask for permission before you dig up lawns and playing fields.

Next steps

Visit the Country Trust website to find out more: countrytrust.org.uk/what-we-do/landing.

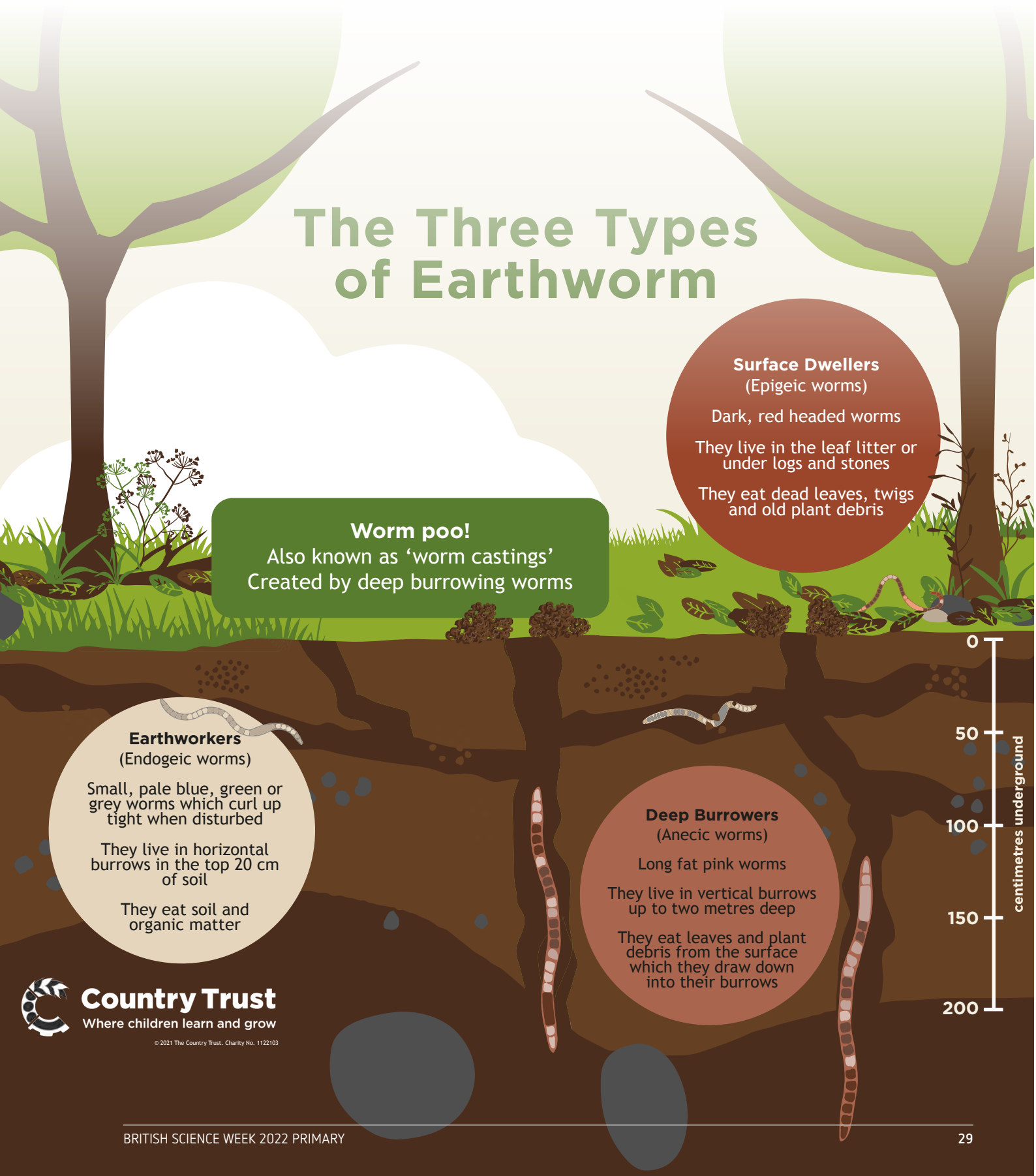
At home

Try making compost from your kitchen peelings and garden waste. You can use the compost to grow your own amazing plants and flowers.

Career options

Soil scientists study how soil impacts our lives including food production, water storage, nutrient cycles, carbon capture and waste disposal. Agronomists work with farmers to help them grow healthy crops. Wildlife and environment officers look after wild plants and animals. Horticulturists grow food, flowers and vegetables.

The Three Types of Earthworm



Country Trust
Where children learn and grow

BRITISH SCIENCE WEEK 2022

UK ANTARCTIC HERITAGE TRUST

INGENIOUS GENTOOS

Can you build your own nest like a gentoo penguin, and test the strength and stability of the nest under windy and rainy conditions?

30 minutes

Skill set: Collaborative, committed, patient

Kit list

- An outside environment e.g. playground, school field, shrubby area
- Nest building material e.g. pebbles, feathers, stones, twigs
- Pretend beaks chopsticks, pegs, or folded card
- A watering can
- A strong fan

Located on a tiny island just off the Antarctic Peninsula is a small museum and post office, and many years ago they were the birthplace of climate science as we know it today.

The island is also home to a particularly loud colony of gentoo penguins, whose general pattern in recent decades has been one of broadly stable or increasing populations and an extension of the breeding range of the species – southward. Imagine living in areas that are experiencing increases in ocean and air temperatures, resulting in an increasing precipitation or rainfall!

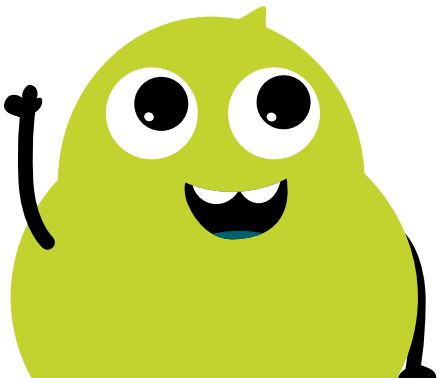
In order for the gentoo species to survive and thrive, they have adjusted their habitat and food choices to adapt to the impacts of climate change.

Instructions

1. Share or read the fact sheet about gentoos. See the penguins in action at penguinwatch.org. Can you build a nest like a gentoo?
2. Get into pairs and gather your equipment. You will be using the equipment to build a nest and then test it in the 'rain' and 'wind'.
3. Discuss these ideas:
   - What materials will you use?
   - How will you fix your nest together?
   - How will you record your results?
4. Collect your pretend beak and practice using it.
5. Once all the nests are built, test how they would hold together in different weathers.
   - What will happen to your nest on a windy day?
   - What will happen to your nest in a rainy weather?
   - What works well and what could be improved?
   - Can you think of any other threats to the nests? e.g. stone poaching, skua dive bombing, heavy snowfall, sneaky sheathbills, careless trampling by seals or people?
6. Make a record of your results. You could also take photographs or make drawings.
7. Present your findings. Be as creative in your presentation as you want!

Watch out

- Listen to an adult about doing outdoor work safely.
- Check that the area is free of unsuitable materials e.g. animal faeces, broken glass or tin cans, and hazardous plants such as stinging nettles.
- Do not put the beaks in your mouths.
- Check for allergies for nest materials used. Wash hands after working outdoors and handling nest building materials.



INGENIOUS GENTOOS

Next steps

Draw a penguin colony and their environment. Send them to info@ukaht.org.

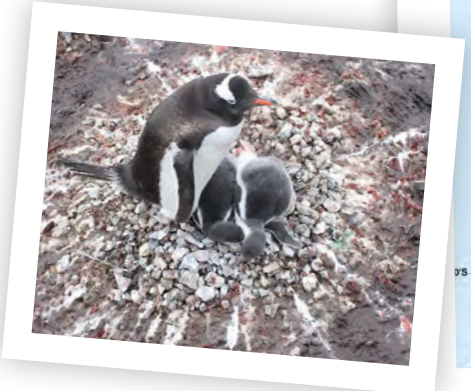
Research how you think gentoo penguins adapt to climate change compared to other penguin species. Why do you think some penguin species such as Adelies and chinstraps are showing signs of declining population?

At home

The UK Antarctic Heritage Trust (UKAHT) have a post office in Antarctica! Design a postcard to send to a friend to tell them about the gentoo penguins. Draw and colour a picture on one side and write your favourite interesting fact about them on the other.

Career options

UKAHT delivers public programmes to engage and inspire people of all ages with 200 years of British human endeavour in Antarctica. They work with artefact experts, climate scientists, explorers, data scientists to name a few that contributed to what we know of Antarctica today. UKAHT also works closely with seabird biologists from the British Antarctic Survey, and together they contribute to Antarctic wildlife conservation and ecosystem health by managing a long term study of the gentoo penguin population at Port Lockroy. Learn more about us ukaht.org.



INGENIOUS GENTOOS FACT SHEET

Species: Pygoscelis papua
Height: 30in (76cm)
Breeding season: November to March
Total breeding population: 314,000 pairs
Favourite food: Krill, fish, shrimp, crustaceans

Did you know?

- Gentoos have streamlined bodies and strong flippers. They can propel themselves underwater at up to 22 miles an hour, faster than any other penguin.
- Penguins have excellent eyesight both on land and at sea.
- We're seeing gentoo penguins increasing their range/spreading southward towards the pole as their environment changes in recent decades. They can be an inspiration on how we respond to our warming planet.
- The UKAHT base in Port Lockroy also has other visitors! Adelie and Chinstrap penguins often come to Port Lockroy, and they also sometimes see King and Emperor penguins too.

Appearance & behaviour

Gentoo penguins are black with a white tummy, a distinctive white patch above each eye and a bright orange bill. They have pink webbed feet and prominent 'brush' tails. They are quite shy and laid back, and spend most of their day hunting and venture to far off places in search of food.

Breeding

Gentoos often return to the same spot each year to breed. Their nests are made from pebbles, bones and feathers and can contain as many as 1,700 individual stones! Gentoos normally lay two eggs which are incubated by both parents for around 35 days. Once hatched, chicks are guarded before they leave the nest and form crèches - a protective group of baby penguins. They continue to be fed by both parents until they fledge on their own at almost three months.

Habitat

Gentoos are found in the Southern Hemisphere and their favourite place to live is the Antarctic Peninsula and sub-Antarctic Islands. Whilst they spend lots of time in water, they like to nest in rocky areas free of snow and ice, which is why Goudier Island (where the post office in Port Lockroy is located) is the perfect location.

Predators & threats

Gentoos have a number of predators including skuas, sheathbills and leopard seals. The leopard seals can be found in the waters around Port Lockroy and are seen more regularly at the end of the season as the chicks begin to move into the water. In 2007 the gentoo species received a near-threatened status by the International Union for Conservation of Nature (IUCN). Following a reappraisal of population trends, the gentoo penguin is currently designated as "Least Concern" the IUCN.

Moulting

After breeding, the parents moult for around 15-20 days. The old feathers are replaced by new ones. Penguins remain ashore during the entire moult period and therefore cannot feed (waterproofing effect of feathers is lost until new feathers have fully grown). Consequently, all penguins undergo an intense, pre-moult food foraging period in which they increase their body weight by up to 70%!

BRITISH SCIENCE WEEK 2022

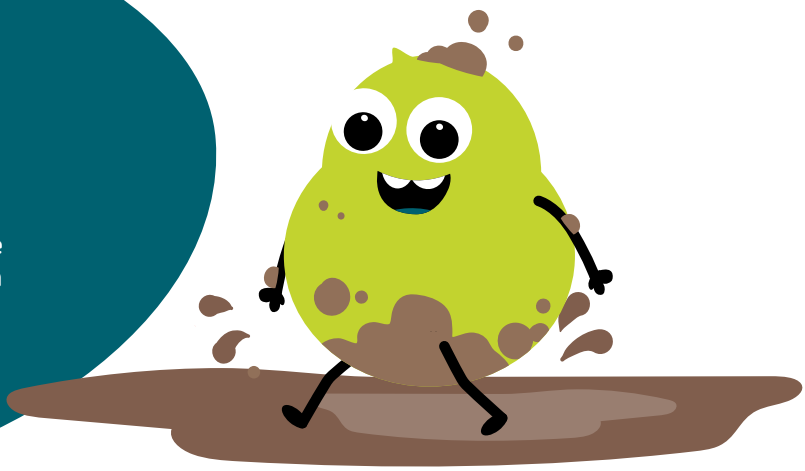
University of East Anglia

GLORIOUS MUD

Healthy soil is important for plants to grow. Did you know that there are different particles that make up soil? In this activity, you will investigate on the texture of the soil in your garden through the help of these particles.

25 minutes

Skill set: Curious, logical, observant



Kit list

- Soil from your garden
- A transparent, straight sided jar
- Ruler
- Water

Instructions

1. Fill your jar halfway with soil, then top it up with tap water and give it a good shake. Now wait two days, until the soil has settled.
2. You will notice about four layers of material. Don't worry if you have fewer layers – it could be your soil does not have all the size fractions.
3. With a ruler, measure the following and write your results in the boxes:

Total measurement of the material =	mm
Depth of bottom layer of sediment (SAND) =	mm
Depth of middle layer of sediment (SILT) =	mm
Depth of top layer of sediment (CLAY) =	mm
Depth of organic matter layer (if there is one, it will be on top of the clay) =	mm

4. Now, work out the percentages of sand, silt and clay:

(SAND x 100) ÷ total height =	% sand
(SILT x 100) ÷ total height =	% silt
(CLAY x 100) ÷ total height =	% clay

5. If any of your percentages are over 60%, this shows that your soil is sandy/silty/clay! If none of your percentages are more than 60%, then your soil is a loamy soil.

Watch out

- Check the garden before use for sharp objects or plants, and animal faeces.
- Make sure an adult helps you find a bottle or jar, and don't start digging up the garden without their permission!
- Wash your hands after handling soil.

Next steps

Watch UEA's children's lecture on 'glorious mud' - suitable for ages 7 and up: bit.ly/mud-glorious-mud

At home

Make a collage or picture using images of soil from the internet. How about a map of the world using pictures of the soil you might find in different regions?

Career options

Credits to Brian Reid, Professor of Soil Science at the University of East Anglia. If you enjoy working with soil, there are lots of possible careers that might interest you. You could become an archaeologist, an environmental scientist, or a gardener -or a soil scientist like Brian!

BRITISH SCIENCE WEEK 2022

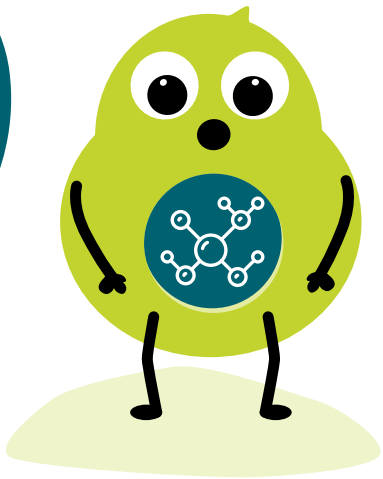
wellcome centre human genetics

MAKING MICROSCOPIC MACHINES

Your body contains thousands of tiny machines, called proteins. Proteins are made of smaller building blocks, called amino acids that form long chains. Their order and shape makes them 'bind' with other molecules and this determines how they work. In this activity, you will build your own tiny machines and think about how their sequence and shape matters.

30 minutes

Skill set: Logical, organised, patient



Kit list

- Scissors
- Pen
- Paper
- Printed cut out sheet

Instructions

1. Cut out the amino acid shapes and two molecules. There are 20 different amino acids that have different properties and shapes. We have five amino acids in this activity. What are the differences between these amino acids?
2. Amino acids join to form a ribbon, and their order makes the ribbon bend into a shape (called a protein). The different shaped ribbons are different proteins. Some proteins, called enzymes, carry out chemical reactions on molecules.
3. Make a protein with the sequence "ABCDE". Proteins bind molecules like a jigsaw. Does this protein fit with either molecule?
4. Look at the protein chain on the next page. Can you work out the letters of each amino acid only from looking at the shapes?
5. Which sequence of amino acids fits molecule 2?
6. Make a random four amino acid sequence. Compare your sequence to others. Does anyone have the same? How many different sequences do you think you can make?

Watch out

Be careful when cutting out the amino acid and molecule shapes.

Next steps

A DNA mutation may change an amino acid in a protein. Does the 'ABBDE' protein fit molecule 1 as well as ABCDE? How about ACCDE? Do you think the protein still works? Look up common causes for DNA mutations.

At home

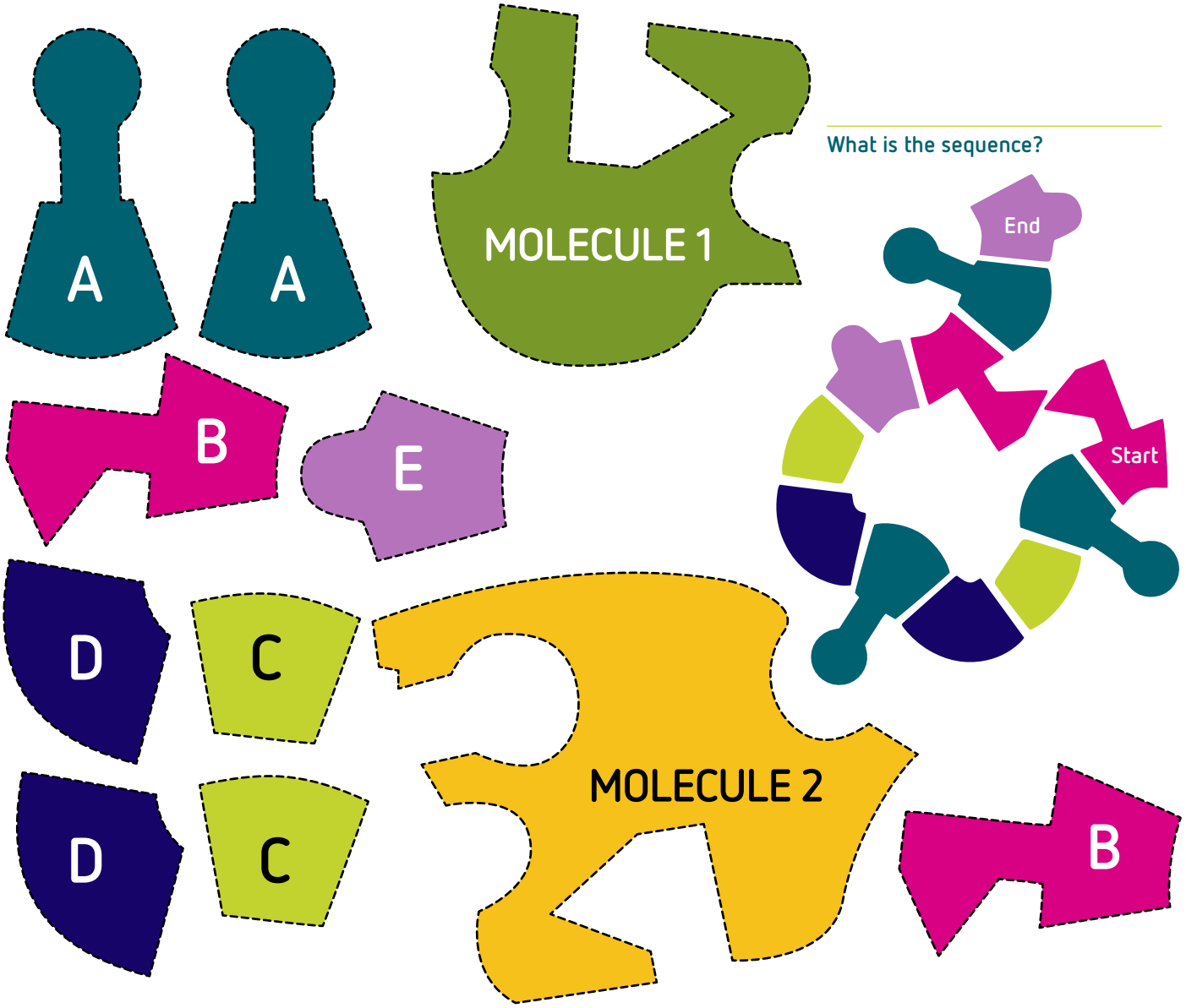
Enzymes can help digest food. A potato crisp will start tasting sweet when chewed. Research which enzyme is responsible. For more information about how enzymes work visit: bbc.co.uk/bitesize/topics/zf339j6/articles/zs9dkty.

Career options

There are lots of jobs studying proteins and changing how they work. Proteins are also used in new and better medicines, washing powders, food production, genetic research and chemical industries. Lateral flow tests use protein antibodies to detect COVID spike protein, and new vaccines are simply instructions to make protein sequences.

MAKING MICROSCOPIC MACHINES
CUT OUT SHEET

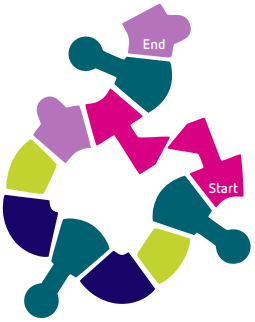
Printed



What is the sequence?

Answers

B A C D A D C E B A E



BRITISH SCIENCE WEEK 2022

@ciecyork
@CrodaSTEM

SUSTAINABLE CLEANING:

WHICH WASHING PRODUCT?

In this activity you will investigate how effective different washing powders are at removing stains from fabric. You will learn that manufacturers are constantly working to develop new products which are more environmentally friendly.

2 to 3 hours

Skill set: Hard-working, logical, patient

Kit list

- Samples of pre-stained white cotton or polyester
- Small sample of different washing powders
- Measuring jug
- Teaspoon
- Thermometer
- Large bowl
- Timer
- Safety glasses
- CIEC interactive planning tool **ciec.org.uk/resources/interactive-planning-tool.html**

Instructions

1. Washing our clothes means that we don't need to throw them away when they get dirty. This protects the environment because people need to buy less clothes. But modern washing machines use lots of water and energy.
2. The growing understanding of this problem means that manufacturers are constantly developing products that work in a more environmentally friendly way. For example, by working at lower temperatures.
3. Plan and carry out a fair test to find out how effective some washing products are at removing stains from fabric.
4. Think about all the possible variables that need to be kept the same such as the type and size of the stain, type and size of fabric, the amount and temperature of water, quantity of washing powder, and the time the fabric stays in the washing solution.
5. Think about what you are planning to observe or measure such as the size and appearance of the stain, or the number of rubs needed before the stain is removed.
6. That's a lot to think about! You may well find the CIEC interactive planning tool useful to help you organise your thoughts.
7. Share and present your results once you have carried out your investigation.

SCIENCE FOR SCHOOLS

Watch out

- Check for allergies. Only use small samples of each product and do not taste them.
- Do not use water hotter than 40°C and mop up spills promptly.
- Protective non-latex gloves will help to prevent skin reactions and safety glasses add an extra level of protection.

More comprehensive safety guidance can be found at **primary.cleapss.org.uk/resource-file/p005-investigating-soaps-and-detergents.pdf**.

Next steps

This activity is taken from CIEC's Sustainable stories and solutions for our planet, which contains two introductory activities and four further main activities with industry stories to help young children develop an understanding of sustainability. Thank you to Thomas Swan and Co. Ltd for funding the development of this publication, which can be downloaded for free at **york.ac.uk/ciec/resources/primary/sustainability**.

At home

The number of products being made by the chemical industry to help us live more sustainably is growing; however, it is important that the companies who make them do so in a sustainable way. Croda is one company who make sustainable products in a sustainable way, while helping the people grow their understanding of sustainability too. Watch this video **crodahomecare.com/mediaassets/videos/home-care/coltide-radiance.mp4** to see how one of our products is helping people's clothes last longer, saving water and reducing waste. **crodascienceforschools.com**

Career options

To continue the delivery of innovative, sustainable and high-performance solutions, you can be an applications scientist, a safety, health and environmental (SHE) advisor, or a process engineer.

BRITISH SCIENCE WEEK 2022

PLANET-FRIENDLY BURGERS

When we grow food it uses resources from the planet such as water, land and energy. If we use more resources than the planet can replace, then we are living unsustainably. In this activity you will design your own healthy, planet-friendly burger and discover how making sustainable food choices can help save our planet.

30 minutes

Skill set: Collaborative, creative, open-minded

Kit list

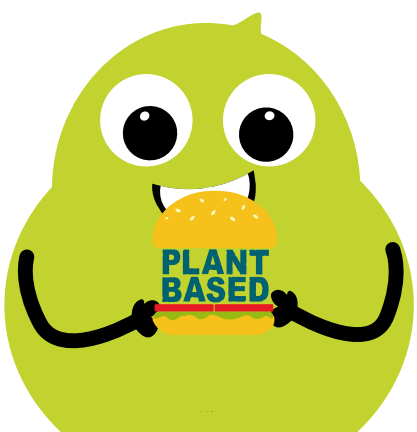
Map of the world, atlas or globe (can be digital)

Planet-friendly burger resource sheets

wwf.org.uk/get-involved/schools/resources/food-resources

WWF YouTube videos: '10 Myths About Deforestation **youtube.com/watch?v=P_bJjPR4Xog**

'Just Imagine: How to Eat Better' **youtube.com/watch?v=KrxweOF9UhY**



Instructions

1. Discuss with your partner what ingredients are usually used to make a burger. What would be in your dream burger?
2. Using the downloadable healthy plate diagram from the resource sheets, classify the burger ingredients into their different food groups. Why is it important for us to eat a mixture of different food groups?
3. Using a map of the world, atlas or globe, locate where the burger ingredients come from.
4. Food miles are the distances that foods have travelled before they reach our plates. Add up the food miles for the ingredients used in the two burgers. Which burger has the most food miles? How do food miles impact the environment?
5. It's not just the distance our food travels that matters. Food has an environmental footprint made up of all the things that can impact the planet including:
   - the amount of water and land it needs
   - whether forests or grasslands are cleared to farm it
   - whether the way it's grown or caught damages ocean life
   - the amount of greenhouse gases produced before the food is transported.
6. Watch the two videos. Which of the burger ingredients do you think will have the highest environmental footprint and why?
7. Design your own tasty, planet-friendly burger – one that is healthy for us and healthy for the planet! Can you find ways of reducing the meat? Can you add more vegetables or pulses? How can you keep your burger's environmental footprint as small as possible?

Next steps

A great thing to do to reduce the environmental impact of our food choices is to plant and grow our own food! Why not plant herbs, fruits or vegetables food at school using our school garden calendar: **wwf.org.uk/sites/default/files/2016-12/Calendar%20A3%20FINAL.pdf**.

Find further education resources on climate change, food and sustainability at: **wwf.org.uk/schools**.

At home

Some logos can help you identify which foods are better for people and the planet. See if you can find any of the following logos on your food at home or in the supermarket: Rainforest Alliance (tea, coffee, chocolate), Fairtrade (tea, coffee, chocolate, bananas), Roundtable on Sustainable Palm Oil (peanut butter, spreads), Marine Stewardship Council (fish).

Career options

There are lots of different careers and jobs that relate to food, climate change and sustainability including being a climate scientist, environmental scientist, food scientist, product designer, policy advisor, ecologist, wildlife conservation officer, sustainability officer, responsible investor, farmer, land use officer and environmental educator.

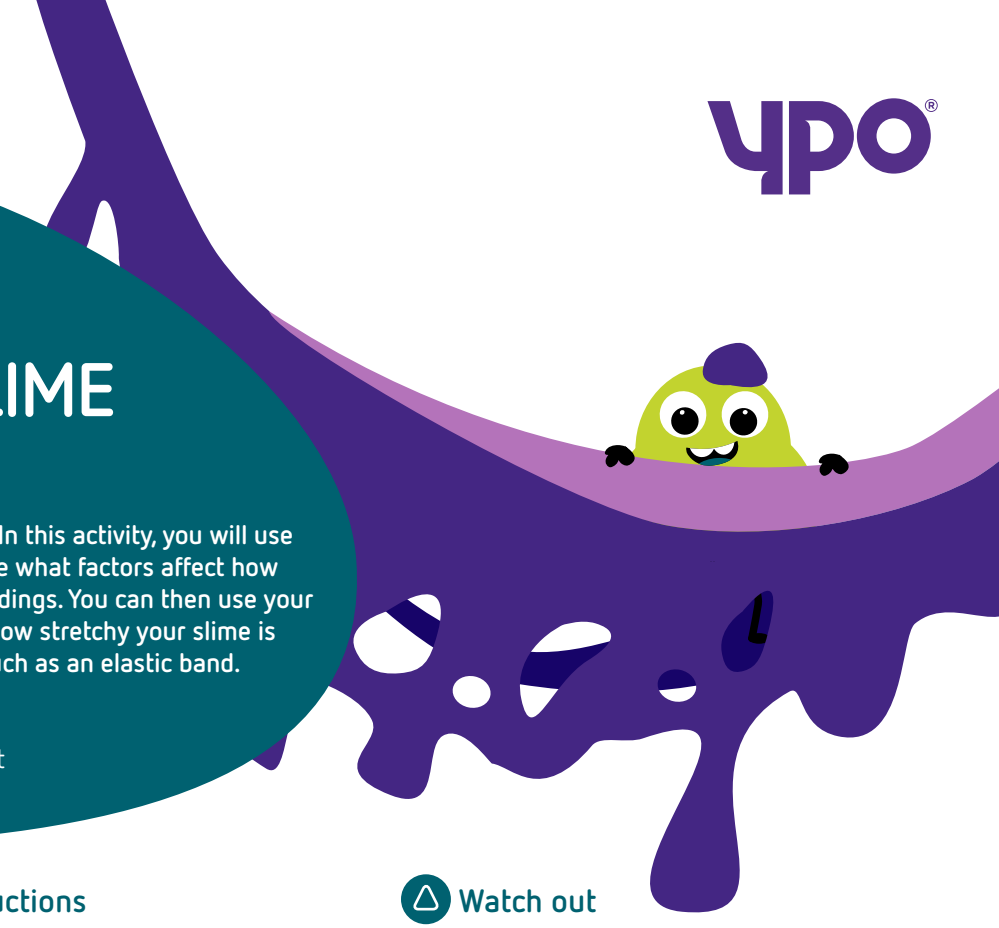
BRITISH SCIENCE WEEK 2022

STRETCHY SLIME EXPERIMENT

How big can you make slime grow? In this activity, you will use your engineering skills to investigate what factors affect how stretchy slime is and record your findings. You can then use your mathematical findings to compare how stretchy your slime is compared to other stretchy items such as an elastic band.

30 minutes

Skill set: Committed, curious, resilient



Kit list

- 150ml PVA glue
- 2-4 tsp of contact lens solution
- 1 tbsp of bicarbonate of soda
- Plastic bowl
- Ruler
- Elastic bands
- Timer (optional)
- Paper and pencil

Instructions

1. Pour the glue into a bowl. Add the bicarbonate of soda, and mix well.
2. Now add the contact lens solution and mix until it becomes stiff and harder to stir.
3. Take the slime out and knead until the desired consistency is achieved. If needed, add more contact lens solution a few drops at a time, to make the slime less sticky.
4. Measure the size of your slime.
5. Start stretching! Use a ruler to measure how big you can make your slime grow.
   - At what point does the slime start to break?
   - At what point does your slime stop returning to its original size?
6. Record your findings. A great example of using mathematical skills is to measure what percentage the slime stretched, compared with your different batches of slime and to other stretchy items.
   - What variable factors may affect its stretchiness?
   - Could the colour, texture, temperature, or amount of time make a difference?

Watch out

- The slime is for experimenting with only, do not eat.
- Take care not to rub your eyes or face after handling the slime. Wash your hands after the experiment.
- Do not take the slime home.
- For disposal, place in a bin bag then in non-recycling waste.
- For more safety guidance, see CLEAPPS guide P042. Find it here: science.cleapss.org.uk/Resources/Student-Safety-Sheets.

Next steps

For more ideas and inspiration visit: ypo.co.uk/primary.

At home

Think about what other properties you could test in materials. Share with the grown-ups at home your ideas on the fun ways you can think of to test these.

Career options

Engineers apply science and maths in their job to help them to solve problems. They also look at the properties of materials when they are designing and building structures, machines and more.

BRITISH SCIENCE WEEK 2022

POSTER COMPETITION

Pupils can get creative and enter the British Science Association's annual, UK-wide poster competition! They can make a poster about any version of 'Growth' that they like and be in with the chance of winning an array of prizes. The activities found in this pack, marked with a paintbrush symbol, could all be used as a source of inspiration to get pupils started.

Kit list

Paper (A4 or A3)

Creative materials, such as:
pens
pencils
scissors
glue
watercolours
paints
crayons
felt
thread
wool
foil
clay
string
beads
stamps
foam
pompoms

Instructions

Encourage pupils to think about different areas of growth so they can come up with ideas to include in their poster. Here are some points and questions to get you going.

- **Get pupils to think about their personal experience of growth** – from growing their own cress plants to overcoming a challenge that they thought they could not do! How has it helped them to become stronger, braver, kinder, or more accomplished?
- **How do pupils think the world has grown?** You could help them to consider population growth, plant growth, economic growth or even the growth of cities and society. What is an example of good growth?
- **Can pupils think of people who have helped or inspired them to grow?** Perhaps they could create a portrait of them to show this?

From the learning of new skills to the development of places and ideas that enable us to do things more efficiently in our everyday lives, growth is everywhere!

Making the poster

Once they've done the thinking, it's time for children to get creative! Posters must be A4 or A3 in size and you'll need to be able to take a photograph of each one so it can be sent to us online for judging. Pupils can use pop-up pictures, pull out tabs or use materials such as pencils, paints, crayons and paper to create their posters.

Submitting the poster

Posters will be judged on creativity, how well they fit the theme and how well they have been made or drawn. Once a child's poster is complete, take a photo of it and complete the online form to submit it as an entry.

Next steps

Celebrate! For more details, along with the full set of poster competition rules and tips, check out our website: **britishscienceweek.org/plan-your-activities/poster-competition**.